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No. 9

LAKE FREIGHT MATTERS.

The stand taken by the United States Steel Corporation and M. A. Hanna & Co. with reference to contracts for the movement of iron ore by lake during the coming season of navigation leaves unsettled as yet the question of rates on a very large amount of ore that must be moved by vessels other than those controlled by ore interests. These two large concerns are still holding out for a rate of 75 cents from the head of Lake Superior, and the past week has brought no indication of a change in their position. In the meantime a little more ore is being covered by other shippers, so that in all nearly 4,000,000 tons of vessel capacity has been engaged at 80 cents from the head of Lake Superior, 70 cents from Marquette and 60 cents from Escanaba. The vessel men seem quite determined to stand for the latter rates. The number of vessel men in the business of carrying ore is not as large as in previous years when the shippers usually managed to fix any rate they might agree upon, and it is therefore more than probable that the struggle from the vessel owner's standpoint will be stronger than in the past. There is also on the side of the vessels the incentive of securing beyond question the business already closed on an 80-cent basis, as this business, distributed among all the large individual owners, would undoubtedly be affected by a backward step in accepting 75 cents from the Steel Corporation. The large interests that are endeavoring to establish a 75-cent rate admit that their claim for a rate lower than last year is not based upon conditions surrounding the iron and steel industry. They say there is no sentiment in the stand they have taken any more than there was sentiment in the action of the vessel owners, who last year advanced the rate on ore from 80 cents to \$1.25—some of it on ore that had been sold on a cost basis generally low. They are simply of the opinion, they say, that the entire vessel capacity of the lakes is such as to warrant them in not paying more than 75 cents. In this opinion the vessel men do not agree with them, especially in view of the very prosperous condition of the steel industry, which has necessitated arrangements within the past few weeks for large importations from Germany and other European countries.

LAUNCH OF EMPEROR WILLIAM'S YACHT METEOR.

The German emperor's yacht Meteor was successfully launched at the works of the Townsend-Downey Ship Building Co., Shooter's Island, N. Y., on Tuesday. The arrangements for the launch were practically carried out to the letter. There was not a suggestion of impediment anywhere. Miss Roosevelt cut the cord holding the weights above the dog shores with a firm, precise blow of her glistening hatchet, and just as the yacht started on its downward glide she struck the bow a sharp blow with the silver encased bottle of champagne and cried in a distinct voice:

"In the name of his majesty, the emperor of Germany, I christen this yacht Meteor."

Miss Roosevelt's blow was, indeed, so vigorous that it broke the silver chain which held the bottle from an overhead pulley and the silver case and shattered bottle fell at her feet. She had to spring backward to avoid a drenching in champagne. The Meteor took the water like a swan, the two masts, dressed with a myriad of flags, topped by the German standard, and the emperor's yacht pennant rose from the deck as the yacht cleared the building shed. No sooner was the launching an accomplished fact than President Roosevelt stepped into the center of the brilliant throng upon the official stand and, raising his silk hat, cried:

"I propose three cheers for the emperor of Germany."

They were given with ringing vehemence, Prince Henry lifting his chapeau—he was clad in the uniform of a German admiral—in acceptance of the honor for his brother, the kaiser. When the cheers were given the prince cried out:

"I propose three cheers for Miss Roosevelt, three times three."

The prince later proposed three cheers for the president and the president then proposed three cheers for the prince—and then they drank a bumper of champagne together. Thus the Meteor was launched.

Reports from the railroad equipment companies (builders of cars, locomotives, etc.) seem to confirm the statement that no material relief in the embarrassing shortage of transportation facilities, especially in the coke and iron regions, reasonably may be hoped for before spring. Equipment manufacturers, in a word, are doing all they possibly can, which is a good deal, to be sure, but the demand for cars far outruns the capacity of their plants. On the books of the American Car & Foundry Co. a score or more of the large railroad companies have big orders for cars, the delivery of which cannot be given for several months to come. The American Car & Foundry Co. alone reports that its orders this year are 50 per cent. larger than those of last year, and confesses that it is booked for eight months ahead. Some of its plants have enough work in view to keep them busy until next February. The Pressed Steel Car Co. makes a very similar report as to the condition of its order books. Both companies have been compelled to enlarge their plants.

The Shipping World Year Book, edited by Mr. Evan Rowland Jones and issued from the Shipping World office, Effingham House, Arundel street, Strand, London, W. C., is at hand. This useful annual has now reached its sixteenth edition. In addition to lists of the tariffs, customs and consular officers, Lloyd's signal stations and rules, all of which are corrected up to the end of the year, there is a serviceable post directory of the world, giving details of the docks, tides, channels, dues and pilotage rates. The book, indeed, includes a wealth of data on legislation, navigation and sea commerce.

PROGRESS IN SIZE BUT NOT IN SPEED OF SHIPS.

Lloyd's Register of Shipping, just issued, says in a review of the growth of ship building that the most noticeable point is the increase in the size of the modern vessel. This fact is brought out very plainly by the relative amounts of tonnage turned out in 1900 and 1901. In the former year the total was 1,442,471 and in the latter 1,524,739 tons—that is to say the tonnage of 1901 showed an increase of 82,268, but, on the other hand, the number of vessels built in that year was fifty-three less than in 1900. These figures are exclusive of war vessels. The freight-earning capacity of these ocean monsters is naturally increased beyond all the limits which used to govern such matters, and the same vessel serves equally as a passenger and cargo steamer under the revised conditions. In the matter of speed we have not gone ahead at the same pace as in size, and for this the reasons are fairly obvious. Considerations of safety render any great increase of speed under existing conditions most undesirable. It is improbable that size will increase much beyond the present limits—in fact, it is a question whether it is possible under the present plans of ship building. If our liners were to go on for another twenty years increasing at their present rate, the means of propulsion would need a considerable amount of adjusting to meet the new conditions.

Forty-one warships have been launched in British yards during the past year—thirty-three from private yards and eight from the government stocks. This marks an increase of two over the previous year. Glasgow, as usual, heads the list in this class of work, having turned out 60,200 tons; London comes second with 30,815 tons, and Barrow third with 26,700 tons. The construction of sailing vessels has been very small, aggregating only 1.5 per cent. of whole output. Of the tonnage of the United Kingdom turned out last year 99.8 per cent. was made of steel.

The total number of vessels (exclusive of warships) launched in the United Kingdom last year was 639, and of these 77 per cent. were for British ship owners and 23 per cent. for foreign and colonial purchasers. Germany was the largest customer, taking twenty-two vessels, or 5.5 per cent. of the total output. Next to Germany comes Austria-Hungary, to whom Great Britain sold twenty vessels, of considerably smaller tonnage than those sent to Germany, and next come, in the order mentioned, Holland, the British colonies, Russia and France.

The construction of vessels for the mercantile marine seems to have left London forever, and to have gone to the north. From being the center of a great industry London has receded to the level of a port, save only in the matter of warships. The leading building center for the class of vessels under consideration in Newcastle, at which place 274,606 tons was turned out followed by Sunderland, Greenock, Middlesbrough, Hartlepool and Belfast, the latter place, although coming sixth on the list, being pre-eminent for the construction of machinery.

In the construction of the world's shipping America comes second to Great Britain, and her record shows an increase over previous efforts. Germany turned out 117 vessels of all sorts, sixteen being war vessels, and of these one was for Russia. France was responsible for 111 vessels, of which seventy-three were sailers, and of these she was the world's largest producer, and some explanation of this is found in the government bounties paid for the production of these vessels. Japan built ninety-four vessels, of which sixty-five were small wooden ships. Shipbuilding in Italy has been declining for several years, and 1901 showed a falling off of 26,000 tons as compared with 1900, which, in its turn, fell far below the previous year's figures.

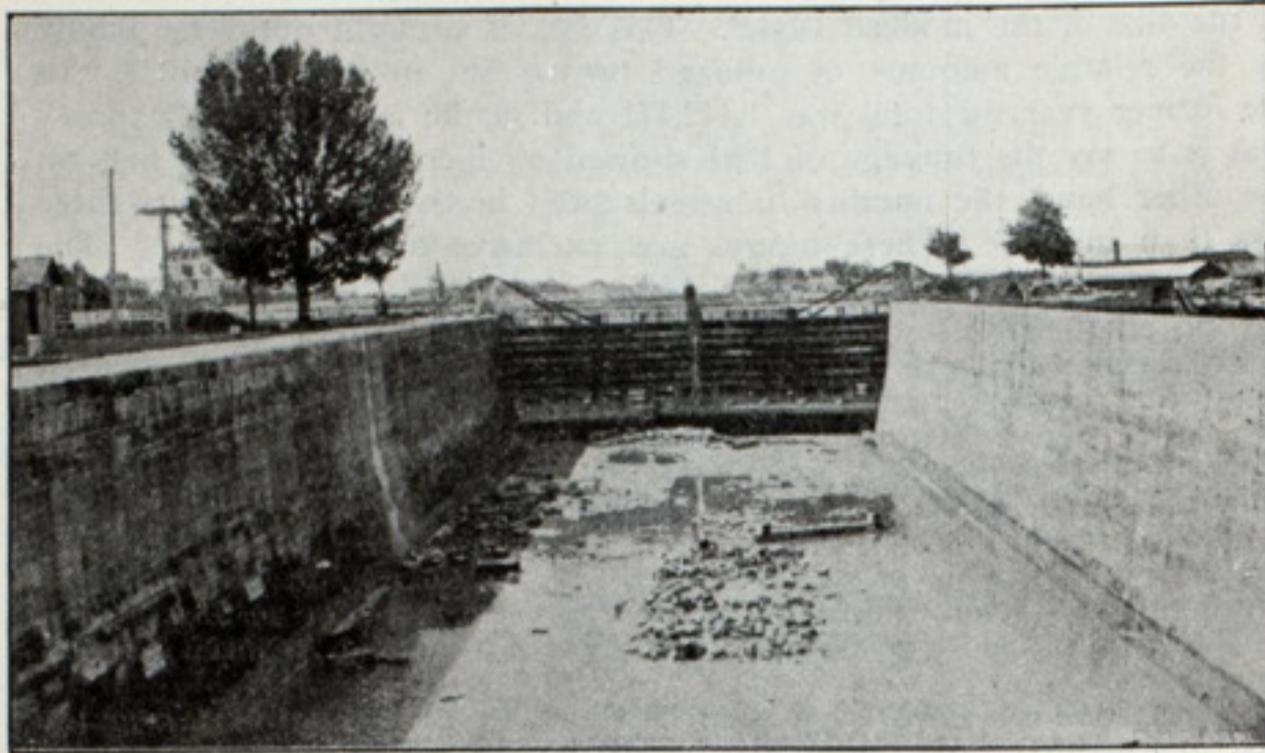
A TURBINE TORPEDO BOAT DESTROYER.

There was launched on the Tyne recently a torpedo boat destroyer which is designed especially for steam turbine machinery, being generally of the same type as the Viper and Cobra. The new vessel is named the Velox and has not been built to the order of any government. The hull has been constructed by Messrs. R. & W. Hawthorne, Leslie & Co. at their Hepburn yard on the Tyne, while the machinery has been made at the works of the Parsons Marine Steam Turbine Co. at Wallsend-on-Tyne. The vessel is 210 ft. long, 21 ft. wide and 12 ft. 6 in. molded depth. Special attention has been paid to the conditions necessary to secure longitudinal strength. The main propelling machinery consists of two independent sets of Parsons turbine engines, one high-pressure engine and one low-pressure engine being on each side of the vessel. This gives four turbines, each of which has its own line of shafting, and as each shaft carries two propellers, there are eight propellers in all. A novel feature in this vessel is the introduction of ordinary reciprocating engines fitted in conjunction with steam turbines. These engines are of the triple-compound type and are coupled direct to the main turbines and work in conjunction with them. They take steam directly from the boilers and exhaust through the high-pressure turbine, the exhaust from the latter passing in turn through the low-pressure turbine and from thence to the condensers. These reciprocating engines are for use at cruising speeds when low power only is needed and are, therefore, of comparatively small size. With this arrangement the Velox is expected to prove an exceptionally economical destroyer at cruising speeds. The boilers are of the Yarrow type.

Agents of marine insurance companies engaged in hull business on the lakes are engaged this week in going over affairs of the Inland Lloyd's Register with Manager Drake at Buffalo. Special care is being given to the matter of vessel ratings, but on the whole no radical changes are looked for. It is probable also that insurance rates and forms of policy will be about the same as last year.

SEMI-CENTENNIAL OF SAULT STE. MARIE CANAL.

In previous issues the Marine Review has outlined the program for the semi-centennial celebration of the commencement of work upon the first canal at Sault Ste. Marie, Mich., including the form of authorization submitted for adoption by congress. The benefits to be realized from the unique presentation of information as to the unprecedented half century development of the industrial progress of the northwest will be unquestionably immense. However, considerable work will have to be done to keep Congressman Sheldon's resolution on the calendar until it is adopted. There are over 11,000 bills awaiting action by the house and over 30,000 have already been introduced into congress this session. Therefore much



THE ORIGINAL SAULT STE. MARIE CANAL LOCK, COMPLETED IN 1855.

watching will be necessary to guide Mr. Sheldon's resolution through this mass of undigested legislation. The Review has in preparation a leaflet revealing the importance of this waterway to the commerce of the United States which it will mail to anyone who desires it.

The construction of the first canal at Sault Ste. Marie was attended with untold difficulties. In 1853 the upper peninsula of Michigan was a remote spot upon this great globe. It was, in fact, practically unknown. Today these obstacles would be laughed at. Money and modern methods have simplified them; but this merely illustrates the tremendous industrial revolution which has taken place during the past fifty years. There is no picture in contrasts like it. The upper peninsula could not furnish the men to dig the canal. The village of Sault Ste. Marie was the only settle-

ment, a mere handful of men of whom the greater number were Indians and half-breeds. Detroit was the nearest city of any importance to the Sault and men and provisions had to be secured there. Five hundred men were obtained at Detroit and taken to Sault Ste. Marie on one of the large lake steamers. A commissariat was organized on the passage, and as soon as the landing was made, horses were hitched up into teams, the lumber hauled to the canal reservation, and in forty-eight hours the men were housed in improvised buildings and regular meals provided for them. On June 4, 1853, the third day after landing, the workmen were organized into working gangs of thirty, each under selected foremen, and formed in ranks, while Mr. Charles T. Harvey, the contracting engineer, broke ground and wheeled out the first barrow full of excavated material. He was greeted with cheers, and for twenty-two months thereafter the work

was prosecuted with the utmost energy, as many as 3,000 men being employed upon it at one time. The Review publishes herewith a photograph of the original lock through which all the commerce of Lake Superior passed for a great many years. It was a state canal but in 1881 Michigan transferred it to the United States government, which, during that year, added a supplemental lock.

Look at the conditions prevailing now and then. In 1853 every one of the many thousand kegs of powder used was transported to the Sault from the states of Connecticut and Delaware. The nearest machine shop was several hundred miles away with no practicable means of communication during five-twelfths of the year. The nearest telegraph station was at Detroit, 450 miles distant. Business letters in mid-winter required six weeks to reach New York and return a reply. All drilling had to be done by hand. The only way to hasten work was to put on more men. In the dead of winter the thermometer frequently registered 35° below zero and the shortness of the day left only eight hours of sunlight. During the hours of such extremely low temperature one man was detailed to stand at the head of each of the runways for barrows with orders when he saw a face frostbitten to rub it with snow until circulation was restored without the barrow man leaving his work.

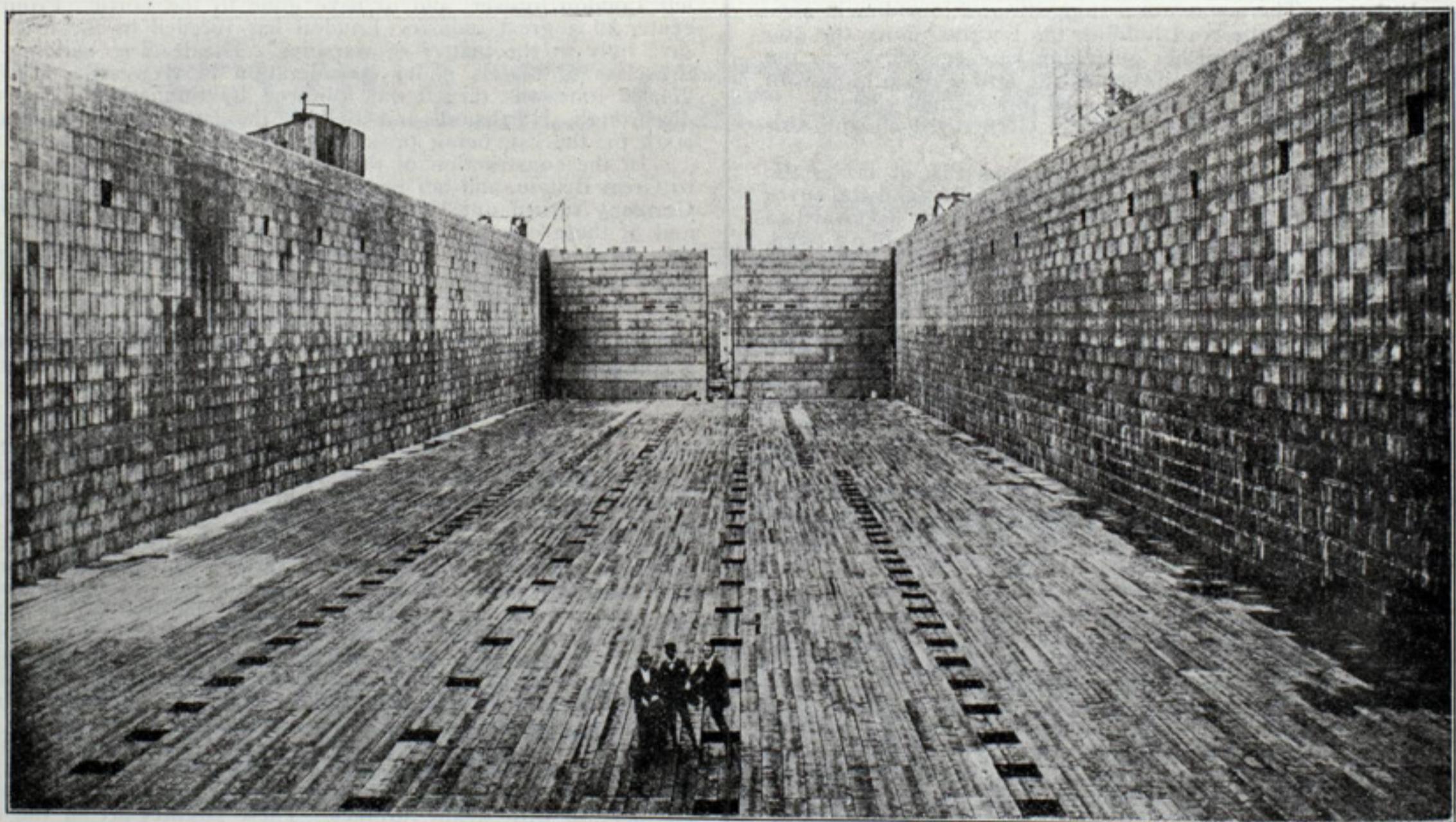
Today this great canal, three times enlarged and still inadequate to the demands upon it, is the unrivaled commercial canal of the world. Last year 25,582,038 tons of freight were carried through it. Through the Canadian canal 2,821,027 tons were transported, making the total commerce of Lake Superior 28,403,065 tons. The Sault Ste. Marie canal was opened for 230 days during the year. Suez, which is opened all the year round, carried 9,378,152 tons in 1900, the statistics for 1901 not yet being available. The new canal at Kiel carried 4,282,094 tons. These figures reveal the giant stature of Sault Ste. Marie among the canals of the world. Accompanying this article will also be found a picture of the Poe lock at Sault Ste. Marie constructed by the federal government.

Shipping interests throughout the great lakes are manifesting much interest in the proposed celebration, while all the great industries of Lake Superior are vitally concerned in it.

WHAT DID MR. CARNEGIE SAY?

Now the burning question is, What did Andrew Carnegie say? Mr. W. D. Forbes of Hoboken, N. J., has taken the pains to write to the American Machinist as follows: "In speaking of Mr. Carnegie you say concerning his epitaph that he said 'Here lies a man who knew how to get around men much cleverer than himself.' This is not what Mr. Carnegie said. I sat within a few feet of him and am positive that his expression was: 'Here lies a man who knew how to get around him men much cleverer than himself.' There is a vast difference in the two statements and I think it is a matter of justice to Mr. Carnegie that you make the correction."

The American Machinist, however, insists that it quoted Mr. Carnegie correctly. As corroborative evidence it offers that the statement was made by Mr. Carnegie as a joke and was so regarded by those who



NEW CANAL AT SAULT STE. MARIE OPENED FOR USE IN 1896-7.

heard it. Now the first version is a joke, but if the word "him" is interpolated it becomes at once a serious statement. The only person who can settle the issue is Mr. Carnegie himself.

It is reported that the Minnesota Iron Co. has discovered a large body of ore on the Vermillion range in the swamp south of Tower Junction. Diamond drills have penetrated a body of hard blue ore, such as is found in the Minnesota mines near by, and below this at some depth was found a grade of ore much like that in the Chandler mine.

The New Orleans Ship Building & Docking Co. has been chartered by the state of Louisiana with a capital stock of \$5,000,000. C. M. Jessup is the president of the company.

SCOTCH SHIP BUILDING COMBINES.

QUESTION OF MANNING SHIPS—BRITISH ARGUMENT AGAINST PROPOSED AMERICAN SUBSIDIES.

Glasgow, Scotland—With the registration of William Beardmore & Co. as a limited liability company and a confirmatory resolution of the shareholders of Vickers, Sons & Maxim, Ltd., the Vickers-Beardmore combination may be said to be complete. It will have an aggregate capital of about £7,000,000 and Beardmore & Co. on registration acquire borrowing powers for £2,000,000. They also obtain powers to extend into new lines of business and to amalgamate with other companies of a similar character. It is stated that negotiations are in progress for absorption into the Vickers-Beardmore circle of another great engineering and ship building establishment on the Clyde. This is not a new design, but whether the present attempt will prove more successful than previous negotiations remains to be seen. Pending completion of the new yard at Dalmuir, Beardmore & Co. are busy at their Govan yard with a first-class cruiser and three large liners all well forward. They are now preparing to lay down two third-class cruisers for the admiralty, but the contract has not yet been officially confirmed.

Some more admiralty work will certainly be needed to keep our ship yards busy later in the year if the demand for merchant craft does not revive. The tonnage of orders coming in is not equal to the tonnage of work that is being turned off the stocks month by month. Since the opening of the year John Brown & Co., Ltd., Clydebank, have booked a 6,000-ton boat for English owners and a 700-ton steam yacht. The Campbelltown Ship Building Co. has booked a 6,000-ton boat for the Indo-China Steam Navigation Co. A. Rodger & Co., Port Glasgow, have contracted for a 2,000-ton sailing ship. The Grangemouth & Greenock Dockyard Co. have booked an oil tank steamer of 6,800 tons capacity and a couple of steamers of 9,680 tons each. Scott & Co., Greenock, are said to have secured orders for two or three big boats for the China Steam Navigation Co., of which details are not yet known. This is all mercantile work, of course, and none of the admiralty contracts for this year are yet definitely placed, although the Clyde expects a good share of them. Against the new work booked the vessels launched in January aggregated fourteen in number and 22,811 tons in measurement, although a good third of the month was broken by holidays. The output consisted of two vessels over 5,000 tons each, one of 4,800 tons, one between 2,000 and 3,000 tons, two between 1,000 and 2,000 tons, three between 500 and 1,000 tons, and five between 100 and 500 tons. The five last named consisted of steam fishing vessels (trawlers), dredgers and barges. Orders for cargo boats seem to have quite dried up, which is not surprising, considering the state of the freight market and the low prices at which second-hand tramps are now procurable. A steel 10-knot boat of about 7,000 tons dead weight capacity, recently launched and nearly ready for delivery, has just been sold for £46,000, which is roughly £6 10s. per ton. This is a new ship. Vessels only a few years old are obtainable far below that figure. Speaking at the annual meeting of the chamber of shipping this week, the president, Col. Ropner, M. P., said that the volume of trade will ultimately overtake the over supply of tonnage and matters will right themselves as they have done in the past. No doubt, but this takes time and the time will be prolonged by the amount of building still in progress. Col. Ropner further said that when the war in South Africa comes to an end there will be a rebound in trade generally, and especially in shipping. He forgets that peace will set at liberty a fleet of ships at present engaged in transport service and that these will begin eagerly competing for freightage long before the pacifications of South Africa can beneficially affect general carrying trade.

Another, though smaller, ship building combine has been effected on the Clyde—at the lower ports. The Ailsa Ship Building Co. of Troon have just absorbed the ship building concern of S. McKnight & Co., Ltd., of Ayr, which has been in existence since 1883. The Ailsa Ship Building Co. was founded in 1886 by the Marquis of Ailsa, Mr. McCredie (formerly a partner in S. McKnight & Co.) and M. Wallace, who converted an old wood ship building yard to modern conditions and have since done a good and continually increasing business, both in building and repair work. The amalgamated concern will add a new engine shop at Troon and otherwise enlarge and extend the engineering branch. At Troon they have also two large graving docks and at Ayr the largest patent slipway in Scotland. The output of new ships in 1901 was, by the Troon yard, 5,004 tons, and by the Ayr yard 1,215 tons, but in addition there was a great amount of repair work done at both yards.

The question of manning was discussed this week at the annual meeting of the Clyde Sailing Ship Owners' Association. President Clink said that judging from his own experience it has been for the last ten years every year more difficult to obtain an entire crew of British seamen for a sailing ship. The reasons, however, are not far to seek. During that period there has been a tremendous expansion, not only in our mercantile marine, but also in our national trade and commerce. Employment and wages ashore have been attractively good just when more men were wanted at sea. Therefore ship owners were compelled to take on more foreigners than many of them would have preferred to do. Of course the steamer was more temptation for the modern seafarer than the sailing ship, and sailing ship owners who carefully train boys for their service find the majority of the boys as they grow up leave sailing ships and go into steam. The steamship owners, however, are now beginning to carry two or more apprentices, according to accommodation, in their boats, and if this plan be generally adopted there should be in a few years a goodly increased stock of British seamen. There is need, however, for the extension of the system of training ships, and Mr. Clink very properly insists that these should not be stationed near large towns and commercial centers where other employments attract, but to be placed within reach of the country districts. The suggestion is often offered that ship owners would always find plenty of men if they would offer a premium on shore wages, but this suggestion springs of false economies. Ship owning is a business in which working costs must be proportioned to earnings or ruin will result. As the old saying has it "freight is the mother of wages," which means that in shipping, as in every other industry, the price of labor is regulated by the relations of supply and demand. Mr. Clink's counter proposition, that British merchants should increase their rates of

freight and ship only by British vessels, won't wash. The British merchant's business is to get his goods to market as cheaply as he can.

One thing the British ship owner does not want is subsidy. He wants to be left alone by law and legislature to carry on his trade fairly and squarely with a fair field and no favor, but he does not relish the idea of being handicapped by the shipping bounties of other nations. Don't think ship subsidies of France, Italy and Austria have done us any harm as yet, for they have certainly not enabled either of these countries to increase their merchant fleets worth a cent. The German direct subsidies have not done us much harm either, as they are more in the nature of payment for services actually rendered, but the German indirect bounties in the way of special railway rates and so forth do touch us somewhat. How the American ship subsidy scheme may affect us can hardly be guessed until one sees more clearly what form the scheme will ultimately take—if it is to pass at all. But to us viewing the situation from this side it seems a wholly unnecessary project. We cannot see the sense of the United States throwing away millions a year on subsidies when a ship building and shipping industry would grow like magic if only the tariff and the navigation laws were sensibly related.

In the annual report of the Liverpool Steam Ship Owners' Association it is brought out that Austria pays £300,000 per annum in direct bounties and subsidies to its ship owners, or equal to 15 per cent. per annum of the total value of the Austrian merchant fleet. Hungary pays £80,000 per annum or equal to 18 per cent. of the total value of its merchant fleet. France pays £1,500,000, equal to 12½ per cent. of the value of its mercantile marine. The German subsidies cannot be estimated in same manner, as they are special, not general, but they amount to probably about 10 per cent. The British mail subventions—which are payment for freight carriers and are in no sense bounties—amount to a mere decimal fraction of the value of our mercantile marine and sea traffic. The British government does not help the ship owner in any way, and instead of giving him assistance hampers him in every way with restrictions, imposts and penalties. It is hardly too much to say that our merchant shipping laws are the curse of the country. Yet our shipping has so far thriven in spite of them and certainly not by means of state subventions. Even now there is a movement to put a further restriction upon the British ship owner by forbidding to employ either foreign white seamen or Lascars, but the amiable promoters of this design have overshot the mark, for Lascars happen to be British subjects, as well as excellent seamen and firemen for eastern voyages. It is a mistake to suppose that foreign European seamen are employed because they are cheap. They receive exactly the same wages and food and accommodation as British seamen in British ships. The question of manning the mercantile marine has, perhaps, not been fully considered by Americans, anxious to develop a great merchant navy at express speed. You may get the ships, but have you got the men willing to quit the good wages and comfort of land employment for a life of ocean wave with smaller wages and less comfort? If not, you will, like us, have to employ foreigners—and be glad to get them.

NEW LAKE SUPERIOR MINING PROPERTIES.

What promises to be a very rich mine on the Marquette range of Michigan is now being opened within the city limits of Negaunee. Diamond drill workings have proved up so much ore that the Cleveland-Cliffs Iron Co. feels warranted in spending a large sum of money in development. The tract of land on which this ore has been found passed through many hands before the Cleveland-Cliffs acquired possession of it—but this is the ordinary thing in the upper Michigan peninsula. Probably no where else in the world has there been such fluctuation of values as in the iron country. In the early days the lands were acquired by the Pioneer Iron Co. No iron, however, had been found within a mile and a half of the property and later, when the tract was disposed of to Sidney Adams of Marquette, the company did not reserve the mineral rights. Some years afterward Mr. Adams disposed of the lands to Negaunee men who wanted them for farms, and he, also, did not make the mineral reservation. The farms were cultivated and although the Negaunee mine, half a mile distant, was opened, practically no one gave a thought to the iron possibilities of the old Pioneer tract. George Maas of Negaunee, however, was an exception. He had made a thorough study of the great ore basin in the vicinity and finally arrived at the opinion that beneath the potato hills lay great mineral wealth. This was little more than a year ago. He figured and planned and finally secured options on the most promising lands of the particular district at figures which at that time the owners were elated to get. Mr. Maas set diamond drills at work, and after considerable trouble in boring through the heavy drift of sand and boulders the ore body was encountered as he anticipated. Following this the tract was sold to the Cleveland-Cliffs company for something like \$300,000, about half of which was clear profit for Mr. Maas. In the sinking of a shaft great difficulty will be encountered in reaching the ledge, which is 167 ft. below the surface. Fifty-seven feet of dry sand must be first passed through, which will bring the miners to the water level of the basin; then there are 73 ft. of quicksand; next 30 ft. of clay and sand, and finally 10 ft. of gravel and boulders. Once the ledge is reached the rest will be easy, for although the slate overlying the ore deposit is firm, it can be easily cut.

The shaft, which to the ledge will be solidly timbered with 14x14-in. white oak, will be what is known as a "drop" shaft, in that instead of being timbered from the bottom, which in this case is impossible, it will be timbered from the top. The sets of timbers, formed in box shape, 10x14 ft. in size, will be set in place, one on top of the other, until a height of 12 ft. or more has been attained. On the top of the structure heavy iron weighing many tons will be placed and the whole forced down by the weight as the sand is dug from under it. The work at the property will be watched with great interest by mining men throughout the entire field, and particularly by those interested, like the Oliver Iron Mining Co., in adjoining lands, where the same conditions prevail. At the Barassa mine a fortune was expended in an endeavor to pierce the quicksand, the work finally being abandoned, while at the Negaunee mine, the scene of the recent disastrous cave-in, and where the bodies of ten victims are still entombed, the work of reaching the ledge nearly bankrupted the promoters.

Mr. H. M. Whitney and Mr. A. J. Moxham have retired from the management of the Dominion Iron & Steel Co., Sydney, C. B.

OFFICERS OF LAKE VESSELS FOR 1902.

PITTSBURG STEAMSHIP CO.,

A. B. Wolvin, Gen. Mgr., Duluth, E. S. Mills, Asst. Mgr., Cleveland.
Str. Bartlett Capt. E. O. Whitney... Engr. A. Rivard.
" Bessemer " M. A. Boyce..... " J. B. Heyward.
" Black " W. B. McGregor. " John Hegemer.
" Briton " James B. Watts.. " A. G. Haig.
" Bunsen " C. E. Moody.... " R. Masten.
" Cambria " J. A. Walsh.... " E. H. Learned.
" Colby " James Burr " F. E. Sanders.
" Colgate " W. J. Hunt..... " W. Welch.
" Coralia " Jno. F. Parke.... " A. McKenzie.
" Cornell " C. Z. Montague.. " A. L. Eggert.
" Corsica " A. J. Greenley.... " J. J. Norcross.
" Cort " Frank Rice " Jos. Taylor.
" Crescent City " A. R. Robinson.. " I. Marshall.
" Eads " R. E. Byrns..... " A. J. Smith.
" Edenborn " Geo. Bell " E. S. Stoddard.
" Ellwood " Harvey Mills " G. G. Lawrence.
" Empire City " R. F. Humble.... " F. Mansfield.
" Ericsson " Richard Jollie.... " A. P. Williams.
" Fairbairn " E. J. Crowley .. " D. A. Black.
" Fulton " S. C. Allen..... " J. L. Walker.
" Gates " R. J. Lyons..... " J. W. Greiner.
" German " Geo. H. Bunker.. " F. Warning.
" Gilbert " R. J. Crowley.... " A. McGillivrey.
" Grecian " W. C. Iler..... " Jno. Dupont.
" Griffin " C. E. Copeland.. " B. Woods.
" Harvard " Wm. D. Ames.... " G. H. Burke.
" Hill " F. P. Houghton.. " W. L. Campbell.
" Houghton " H. W. Stone.... " J. W. McEachren
" Hoyt " R. H. Brooks.... " J. B. Miller.
" Joliet " A. W. Burrows.... " Geo. Lynn.
" LaFayette " F. A. Bailey.... " L. Walder.
" LaSalle " W. D. Graham.... " J. R. Hall.
" Linn " J. W. Morgan.... " H. Dupont.
" Manola " Wm. Pardo " Wm. Densmore.
" Mariska " A. J. Talbot.... " S. H. Hunter.
" Maruba " J. Laframboise .. " Geo. Arnold.
" Matoa " J. F. Johns.... " E. J. Rae.
" Marina " John Nahrstedt .. " G. A. Brown.
" Masaba " W. A. Reed..... " L. F. DeMay.
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 (Continued on page 24.)

AMERICAN COAL IN EUROPE.

BY A. M. THACKARA, CONSUL AT HAVRE.

The most important factor in the creation of a permanent export trade in American coal is the solution of the question of cheap ocean transportation. With the unusually low ocean freight rates between American and European ports now prevailing, which can only be considered as temporary, importations of American coal into portions of France are possible. To secure permanent foreign outlets for the products of our coal mines, it remains for American ingenuity, backed by American capital, to devise some means by which coal can be carried at all times to European ports at rates low enough to permit the American exporter to offer his product at prices which will enable him to compete with British coal. It is my opinion that if regular lines of steamers, built upon up-to-date economic principles, especially for carrying large cargoes of coal and fitted with modern labor-saving appliances, with fixed sailing dates, were established between our coal-shipping ports and certain ports of France, enough return freight could be secured to reduce the cost of coal transportation to a minimum. At present, Marseilles is the port in France where the conditions are the most advantageous for the sale of American coal, owing to the comparatively high freight rates from British coal-shipping ports. During 1899 and 1900, in consequence of the high prices of British coal, contracts were secured by American exporters, which, for the most part, have been filled. The American combustible has gained a foothold in the southern European market, and it remains for our exporters to make it a permanent one. The importations of coal into France from the United States are not large, as compared with the total American coal exports; but the statistics indicate that for the past three years the receipts of American coal in this country are increasing. For the twelve months ended June 30, 1901, the coal exports from the United States to France were 208,941 tons, against 55,317 tons and 1,011 tons, respectively, during the same periods of 1900 and 1899. The British consul-general at Marseilles, in a recent report to his government upon "American vs. British Coal in the Mediterranean," says, in part:

"I hold, therefore, that for the present American competition in coal is not a very serious matter. But now let us look a little farther ahead and consider what must inevitably happen if Americans succeed in passing their shipping-bounty bill. With 2s. 6d. (60 cents) per ton in their favor, and with high prices ruling at home, American competition will be a very serious matter indeed. American coals now offered at 1s. 6d. (36 cents) per ton below competing qualities of British are, in the opinion of Americans, quite able to stand a further reduction, if this is necessary to meet any further fall in British prices. They do not believe that prices in Great Britain will ever come down below American output prices; but if they do, the American shipping-bounty bill will by that time have enabled them to become masters of the situation. With the passage of the bill the very thorough preparations that have been made for the past two years by the Baltimore & Ohio and other leading companies in the United States, with a view of ultimately monopolizing the Mediterranean coal trade, will have matured sufficiently to permit of their starting operations on a large scale."

The new French shipping-subsidy act, which has lately passed the chamber of deputies and which is to be considered shortly by the senate, will, in the near future, become a law, probably without any material change by the latter body. This bill greatly favors the construction of steamers in France up to and including 7,000 tons gross measurement, by granting, with certain exceptions, a navigation bounty (prime de navigation) of 1.70 francs (32.8 cents) per gross ton per 1,000 miles sailed to steamers measuring over 100 tons gross and up to 3,000 tons gross, and a bounty of not less than 1.50 francs (28.95 cents) to steamers of over 3,000 tons gross and up to and including 7,000 tons gross for the first year after registration, with a gradual annual decrease for fifteen years. From this bounty there is deducted a sum equal to 11 per cent., 5 per cent. of which is divided among the crews of the steamers and 6 per cent. is reserved by the various sailors' pension funds. The minimum bounty for steamers over 7,000 tons gross for the first year is 75 centimes (14.475 cents).

An example showing the benefits which a French-built steamer of 7,000 tons gross (not belonging to a regular subsidized mail line) engaged in carrying coal or other merchandise between New York and Havre, for instance, would derive from the new act will be of interest.

The official distance between Havre and New York upon which the subsidy would be based is 3,171 miles; 7,000 tons at 1.50 francs per ton per 1,000 miles equals 10,500 francs (\$2,026.50); distance between Havre and New York and return, 6,342 miles; 10,500 multiplied by 6,342 equals 66,591 francs (\$12,852); deduct 11 per cent., 7,325 francs (\$1,414); net bounty for the first year, 59,266 francs (\$11,438).

If the steamer left Havre without any cargo and returned from New York with 9,000 tons of coal, the bounty received by the owners of the vessel the first year would be equal to \$1.27 per ton of coal.

The annual decrease in the bounty to steamers, commencing with the date of registration of the vessel, is 4 centimes (.772 cent) for the first period of five years; 8 centimes (1.544 cents) for the second period of five years; and 16 centimes (3.088 cents) during the third and last period of five years. In other words, the average bounty to steamers of from 3,000 to 7,000 tons for the first five years would be 1.42 francs (27.4 cents); the average bounty for the second period of five years, 1.10 francs (21.25 cents); and for the third and last period, 43 centimes (8.29 cents). With this assistance from the government, owners of French-built steamers will be in a position to enter into contracts with American coal shippers to transport coal to France and other countries at low rates.

French capitalists are studying the question whether American coal, carried on subsidized French steamers, could not be delivered in France and other European countries at such prices as would enable it to enter into successful competition with British and other coal. With this end in view, one syndicate has already sent a representative to the United States to confer with colliery proprietors, coal shippers, and others interested.

The British foreign coal trade is well established, and it will be only by intelligent and systematic effort on the part of American coal miners

and shippers that American coal can expect to compete with British coal in the European markets. Cheap ocean transportation having been secured, selling arrangements should be made by which business will be transacted direct with the importer, or American coal firms should have reliable agents to represent them, instead of doing business through three or four different persons. American shippers are sometimes represented by English houses which have no business relations with France, and have to depend upon other English houses which have. As a consequence, coal which sells at Philadelphia at \$2.50 per ton is offered to French consumers at from 50 to 75 cents more, as the English middlemen must have their profits. Competition is so keen that American coal should not have to bear any increased expense from commissions paid to middlemen.

Depots filled with modern labor-saving apparatus should be established at convenient points where coal can be discharged from vessels, stored, loaded on cars, etc., at the lowest cost. From these depots orders for less than cargo lots could be filled.

American exporters should study the requirements and the customs of foreign trade and conform to them. They must not expect to sell coal for cash or demand payment before the coal leaves the United States. They should make regular deliveries of the quality of coal ordered.

The two cargoes of anthracite coal recently sent to Rouen, which excited such interest among the coal dealers in Paris and elsewhere, turned out so badly that the trade in American anthracite in northern France, which looked so promising, has received a setback which will require a long time and hard work to overcome.

The following are the prices of British coal which ruled in December, 1901—and which have not changed materially since—f. o. b. shipping ports, with the export tax of 1s. (24.3 cents) included, 2.5 per cent. discount for payment in thirty days' time:

Description.	s. d.	s. d.	Price.
Colliery screened		13 0	\$3.16
Small		6 0	1.46
Best Durham gas coal		13 0	3.28
Best Cardiff:			
Colliery screened	16	0 to 17 6	\$4.01 to 4.25
Small	10	0 to 12 0	2.43 to 2.92
Best Newport:			
Colliery screened	15	0 to 16 0	3.65 to 3.89
Small	9	9 to 10 6	2.37 to 2.55
Best Scotch, colliery screened		12 0	2.92
Swansea anthracite:			
Colliery screened, large		20 0	4.87
Nut		27 0	6.57

The freight rates from British shipping ports at present are as follows to the places named:

FROM THE TYNE.			
Hamburg	\$0.97	Nice	1.39
St. Nazaire88	Carthagena	1.17
Rouen	1.21	Alexandria	1.27
Havre	1.00	Bombay	2.43
Genoa	1.27	Barcelona	1.58
Bilbao79		

FROM CARDIFF AND NEWPORT.			
Malta	\$0.97	Bordeaux	1.16
Genoa	1.30	St. Nazaire92
Alexandria	1.27	Marseille	1.30
Port Said	1.21	Rochefort	1.06
La Rochelle	1.11	Gibraltar	1.27
Venice	1.64	Barbados	1.55
Las Palmas	1.46	Havre	1.03
Rouen	1.27		

FROM SCOTCH PORTS.			
Bordeaux	\$0.96½	Trieste	1.58
Fiume	1.58	Hamburg	1.15
Genoa	1.30	Havre	1.03
Kiel	1.15		

American soft coal is quoted by a large importer at from \$4.38 to \$5.35 per ton f. o. b. at French Channel ports, according to quality, and at from \$4.50 to \$5.47 at Mediterranean ports; the freight from American shipping ports being from \$2 to \$2.19.

American anthracite, nut size, is quoted f. o. b. Havre at 28s. (\$6.81), while the price of Swansea anthracite, nut coal, is 31s. (\$7.54). Some French dealers in British anthracite import their coal in large colliery sizes (screened), and with their own machinery break it up and sort it into sizes suitable for their customers. They find it more satisfactory and more economical to prepare the coal themselves than to pay the extra price charged by the Swansea colliery owners for nut sizes.

There are three sizes of anthracite nut coal known to the French coal trade: German size, 0¾ in. to 1⅓ in.; Paris size, 0¾ in. to 2¼ in.; and French size, 1⅓ in. to 2⅔ in.

The president of the Western railway of France informs me that the coal most desired by his company for use in their locomotives should contain from 18 to 20 per cent. of volatile matters, with an ash result of from 6 to 7 per cent.; that the quantities of coal contracted for vary and depend greatly upon the price. When the coal is imported by sea, the contracts are made so that full steamer cargoes may be delivered. Deliveries are generally made between Jan. 1 and Aug. 31.

Permanent foreign trade in American coal will depend upon:

- (1) The establishment of lines of steamers with regular sailing dates, built for carrying large coal cargoes, fitted with up-to-date appliances, and capable of being run under the most economical conditions.
- (2) The erection of coal depots fitted with modern labor-saving apparatus for discharging and handling coal.
- (3) The creation of a complete organization for selling coal and doing away with all middlemen.
- (4) The observance of the commercial customs of the foreign country.
- (5) The carrying out of the letter and spirit of all contracts.

THE IRON INDUSTRIES OF GERMANY.

By ERNEST L. HARRIS, Consular Agent at Eibenstock.

The principal iron ore deposits of Germany are situated in Silesia, Thuringia, Hanover, Lorraine, Westphalia, Saxony and the Rhine province. There are about 1,500 mines or shafts in operation, which give employment to 40,917 miners, exclusive of those employed in coal, zinc, salt, lead, copper and silver mines. In 1899, the total output of iron ore was estimated at 17,989,700 tons valued at \$16,707,600. Of this amount 3,247,888 tons were exported, chiefly to Belgium and France. In 1900, 4,107,840 tons were imported into the German empire, fully 75 per cent. coming from Sweden and Spain.

The iron market in Germany underwent great fluctuations shortly after 1873. This was caused principally by over speculation, and a change for the better was first noticeable about 1880, when the German government took charge of the railways. The wonderful development of electricity as a traction power within the past ten years has made itself felt among the iron industries all over the empire. The present outlook for the iron industry in Germany is not bright. Manufacturers, on the whole, are not building new factories or enlarging the old ones. During 1900, the ship building industry flourished as never before, but now even this shows signs of falling off. It is only in the navy yards that the activity has continued unabated, the passage of the naval bill by the Reichstag, in 1900, having created a demand for iron for fifteen years to come. The real causes of the present depression are the increase in the price of coal, coke and iron ore, and the advance in wages—these coming at a time when the condition of the world's markets, agitated by political events in South Africa, China and South America, was not favorable to an advance in the price of iron products.

In 1894, there were 208 iron foundries and smelting works in the German empire, which gave regular employment to 24,110 skilled laborers.* In 1899, the total output of crude iron was 8,120,000 tons. These figures were exceeded during the same year by Great Britain with 9,450,000 tons, and by the United States with 13,840,000 tons. The other iron producing countries of the world are as follows:

	Metric tons. (2,205 lbs.)
France	2,525,000
Russia	2,500,000
Austria-Hungary	1,430,000
Belgium	1,000,000
Sweden	530,000
Spain	260,000
Japan	20,500
Italy	12,400

Of the output of iron in Germany during 1899, only 6½ per cent. was of the Bessemer process, while 55 per cent. was of the Thomas process. The manufacture of puddled iron in the empire is on the decrease, but for welding purposes it is still very much in use. Iron is produced cheaper in the United States than in any other country. This is due to the fact that the ore mines, with the exception of those of Sweden, are richer than any as yet discovered in Europe; also to the up-to-date machinery employed and the cheap rail and water transportation rates.

In the valley of the Saar, and in Peine-Ilsede, Germany enjoys very favorable conditions for the production of iron. One disadvantage in connection with the iron works situated in the Ruhr valley, is the reshipment of ores from the Rhine to the different points of consumption. If the freight rates between the United States and Germany could be sufficiently reduced, it would not be impossible for American producers to develop a regular raw-iron export trade to Germany. In 1899, large quantities of American pig and cast iron came over as ballast. American wrought and rolled iron is superior to the German product, and for that reason is imported in considerable quantities.

Germany's foreign commerce in iron and iron products of every description and quality was, for 1900, as follows:

Product.	Exports. Metric tons.	Imports. Metric tons.
Old and waste iron	61,096	100,383
Angle iron	215,641	827
Loop iron and ingots	33,627	2,778
Pig and cast iron	129,409	726,712
Plowshares and welding iron	172,533	37,809
Wire tacks	46,906	120
Iron rails	155,656	343
Iron wire	169,839	8,711
Railway material, trucks, etc.	48,236	2,170
Iron pipes	39,756	20,262
Articles made from cast iron	30,284	2,341
Crude iron	196,759	45,348
War material, cannon, balls, etc.	2,734	7
Marly iron, quartz, etc.	822,840	386,028
Miscellaneous	40,950	18,863
Total	2,166,266	1,352,675

After England, Germany is the most formidable competitor of the United States in the iron markets of the world. Germany, however, is vastly better equipped in the technology of smelting than England, and in this respect is a rival worthy of our profound attention. The depression in the iron industries of Germany is due, besides the causes stated above, in a second degree to American competition. So keenly has this competition been felt within the past two years that experts are urging German producers to exert themselves to the utmost to prevent American iron manufacturers from displacing them in the markets of the world. The only means of averting this, it is claimed, is by technical education; nothing but the fine quality and character of the products themselves will save Germany's foreign commerce from being crushed beneath the weight of American consolidated capital and industrial combinations. Anyone familiar with the nine technical universities of Germany will admit that her methods of education and manufacture are worthy of emulation. In

*It must be understood that these figures include only those employed in the actual production of raw iron from iron ores. The total number of persons employed in all the mines (including coal, salt, lead, etc.) and iron and steel works of the German empire is 567,753, of whom 15,577 are females.

each of these universities, prominent attention is given to "Hüttenkunde," or the art of smelting, and every year a corps of young men is sent out well prepared to take positions as managers, foremen, or in any other capacity in the iron foundries and smelting works of the empire.

The prospects for American iron in the world's markets seem bright. The competition between England, Germany and the United States for the supremacy of the iron markets in the British colonies, South America, and the far east will become keener every year. In the long list of American industries which require great intelligence and skill, those of iron and steel stand at the head. The battle to win foreign trade is always a two-fold one. When a market has been won, the fight begins to retain it. Our skilled workmanship, raw material easy of access, and up-to-date machinery are the weapons with which we will win these markets. Let us gird on the armor of technical education to defend and retain them.

THIRD IN EXPORTS TO JAPAN.

The recent high price of American cotton caused the United States to take third rank in 1901 in the list of countries from which Japan drew her imports, and transposed India to the second place, leaving the United Kingdom still at the head of countries from which Japan draws her importations. The December, 1901, statement of the commerce of Japan, which has just reached the treasury bureau of statistics, shows that the imports of raw cotton into Japan from the United States, which amounted to 1,112,834 piculs in 1900 (picul = 133.3 lbs.), fell to 458,432 piculs in 1901; while the imports of raw cotton from India increased from 766,847 piculs in 1900 to 1,667,425 piculs in 1901. The value of the imports of raw cotton from the United States fell from 27,010,134 yen (yen = 49.8 cents) in 1900 to 12,986,748 yen in 1901; while that from India increased from 17,863,925 yen in 1900 to 38,118,831 yen in 1901. The average price per picul of American cotton imported in 1900 was 24.27 yen, and in 1901 28.33 yen; while the price per picul of the cotton from India was 23.29 yen in 1900 and 22.86 yen in 1901. It will be observed that American cotton increased 16.7 per cent. in cost per picul in 1901 compared with 1900, while Indian cotton fell in price about 2 per cent., and that the average price of American cotton was in 1901 23.9 per cent. higher than that of Indian cotton. With an increase of 16.7 per cent. in the price of American cotton and a decrease in the price of Indian cotton, thus bringing the cost of American cotton nearly 24 per cent. higher than that from India, the result was inevitable—a marked reduction in the imports of American cotton and a marked increase in the imports of Indian cotton.

Notwithstanding, however, the temporary check in imports of this single article by Japan from the United States, the general imports of that country in 1901 give to the United States a very satisfactory standing, and show that aside from the abnormal conditions by which this single article—cotton—is affected, Japan continues to increase her demands upon the United States. They also show that the growth in imports from the United States during the period of 1890-1901 has been much larger than from any other country in the world. Taking the total imports into Japan, including both manufactures and raw materials, the imports from the United States have grown from 6,874,531 yen in 1890 to 42,769,725 yen in 1901; those from Germany, from 6,856,955 yen in 1890 to 28,320,097 yen; those from the United Kingdom, from 26,619,102 to 50,575,781 yen; those from India, from 8,910,891 yen in 1890 to 42,779,900 yen in 1901; those from China, from 8,849,685 yen in 1890 to 27,256,979 in 1901. Thus, while the United States is temporarily transposed to third place in the list of countries from which Japan draws her imports, by reason of the abnormal conditions in the prices of cotton, the record of growth is more favorable to the United States than that of any other country, the imports of the United States into Japan being in 1901 more than six times as great as in 1890; those from India less than five times as great; those from Germany, four times as great; those from China, three times as great, and those from the United Kingdom about twice as great in 1901 as in 1890.

The following table shows the total imports into Japan from the United States, United Kingdom, Germany, China and all other countries in 1890 and 1901, respectively:

	1890	1901
United States, yen	6,874,531	42,769,425
United Kingdom, "	26,619,102	50,575,781
Germany, "	6,856,955	28,320,097
China, "	8,849,685	27,256,979
India, "	8,910,891	42,779,900
All other countries "	22,443,710	64,114,462
Total	80,554,874	255,816,644

MAY RETIRE SOME PREFERRED STOCK.

It is reported that a proposition is under consideration by the interests controlling the United States Steel Corporation for an additional issue of bonds by the corporation. It is proposed that the preferred shareholders shall be permitted to convert part of their stock into 5 per cent. bonds secured by the same indenture that secures the bonds at present outstanding. The bond issue, it is understood, is also likely to provide for the cost of extensions and improvements of the Steel Corporation's plant. The balance sheet of the corporation, as of Nov. 30, 1901, contained in the report to the shareholders, submitted at the annual meeting lately, showed a total of the 7 per cent. cumulative preferred stock outstanding amounting to \$510,173,778. Of course if all this stock was converted into 5 per cent. bonds there would be a saving representing the difference between 5 per cent. interest and 7 per cent. dividends of more than \$10,000,000, but it is not the present intention to fund all the preferred shares. Even should additional bonds besides those issued to retire preferred stock be issued, to provide money for extensions and improvements, it is proposed that enough of the preferred stock shall be retired to make the fixed and the dividend charges combined smaller than at present.

The Ontario Ship Railway Co.'s request for an extension of time for the commencement and completion of a railway from Collingwood to Toronto, by which loaded ships can be transported from Georgian bay to Lake Ontario, has been acted upon by the railway committee of the Ontario legislature. The request was granted on the understanding that \$50,000 must be spent the first year and the railway finished in three years.

SHIP BUILDING AT PHILADELPHIA AND VICINITY.

Philadelphia, Pa., Feb. 26.—As already announced in the Review the International Navigation Co.'s new passenger and freight liner Kroonland was successfully launched from the works of the William Cramp & Sons Ship & Engine Building Co. last Thursday. The sponsor was Mrs. Rodman Griscom, daughter-in-law of Clement A. Griscom, president of the company. The launch, originally intended for the early days of February, was time and time again postponed, owing to the presence of the great amount of floating ice in the river, but as the work on the vessel had progressed to a point where it would be greatly retarded if she remained longer on the ways, President Charles H. Cramp decided to put her overboard despite the obstacles which intervened. There were present on the stand, by special verbal invitation of the owners and builders, a company of guests which included Mrs. Clement A. Griscom, Mr. and Mrs. Edward R. Starr, Miss Sophie Starr, Mr. and Mrs. Frank A. Potts, Dr. and Mrs. Gamble, Miss Florence Cramp, Dr. Coleman Sellers, Mr. and Mrs. F. N. Morris, Percy Chubb, Henry C. Boyer, E. B. Smith, Dr. Hendrick Muller of the Hague, Holland; Com'dr Moore, U. S. N.; Naval Constructor J. H. Hanscom, and Capts. Stchensnovitch, Pelican and Ossipoff and subordinate officers of the Russian navy, attached to the Retvizan. Although eminently successful, the launch of the Kroonland was not without a feature not down on the program, and one certainly not desired by the builders. It was no less than the freezing of the tallow, which had been spread thickly on the launching ways, and which resulted in the great craft sticking fast before she was fairly under way. Under the direction of Edwin S. Cramp, superintendent engineer of the company, a force of mechanics, assisted by forty jacks, soon had the Leviathan again in motion.

At the luncheon which followed the ceremony there were several utterances by the president of the company to which the vessel belongs replete with significance to the future importance of the port. It is a well-known fact that Mr. Griscom desires more commodious and faster vessels for the Philadelphia-Liverpool service, and awaits but the long-deferred channel appropriation for materializing his project without delay. While it has not been definitely promised that the Kroonland and her sister-ship, the Finland, will run to this port, it is more than probable that the two vessels which they will replace in the New York service will be transferred to the Philadelphia line. The Finland is rapidly nearing the launching point and will likely take her maiden dip within three weeks.

An event of more than usual interest to ship builders generally will be the triple launching, from the works of the Harlan & Hollingsworth Co., March 1, of the torpedo boats Stringham, Hull and Hopkins. Preparations are under way for elaborate ceremonies on the day of launching, and many representatives of the army and navy will be present. The navy department is awaiting with interest the outcome of the trial trip of this trio. As before mentioned in correspondence from this port, this species of war craft is viewed with distrust by all who have contracted for their construction. Naval Constructor Hanscom, heretofore reticent in expressing an opinion in regard to the merits and demerits of the original designs submitted by the navy department, and on which bids were asked, is now more accessible to interviews on the subject. It was largely through Mr. Hanscom that the bureau of construction decided on the changes in the lines of the hulls of the Bainbridge, Barry and Chauncey, with the end in view to make the successful speed trial less a matter of speculation. As heretofore explained, this was effected by cutting away the sterns and slightly arching them above the propellers, thus allowing them to pass more easily through the water. This change has not yet been determined on in regard to the Stringham, Hull and Hopkins, and, as the Bainbridge failed, will probably not be effected.

The new Maine, at Cramps' ship yard, after strides toward completion scarcely less than wonderful, is now entering on a period which is, to say the least, vexatious to the builders. Non-delivery of armor-plate has ever been a bug-bear to the Cramps, and it is again in evidence with every possibility that there will be a repetition of the instance of the Alabama. If the Maine is delayed from this source, the builders will undoubtedly file a heavy claim against the government. They are desirous of having this vessel accepted by next February, at the latest, but from present prospects there is little hope for realization.

For practically a week the port of Philadelphia has been closed to the sea by ice. Such conditions have not prevailed here for a decade, and the loss to vessel owners through the slow movements of their various craft will run into enormous figures. The city ice-boats have been found inadequate to meet the severe conditions imposed upon them, and agents and others interested in the prompt delivery of freight are loud in their complaints.

Shipping circles regret the sudden death of Robert Turner, who for years was therein associated in the capacity of maritime reporter on the Public Ledger and later in the same capacity with the Evening Bulletin. Mr. Turner was an indefatigable newsgatherer, zealous and faithful in the discharge of his duty. He possessed to an unusual degree the confidence of the various large interests of the port, and leaves behind him a memory which will long be cherished by his many associates.

DEEPENING OF CHANNELS—LOWER LAKE LEVELS.

Editor Marine Review:—I found enclosed in your issue of Jan. 30 a very interesting supplement in the form of a diagram giving fluctuations of the lake levels by months from 1860 to November, 1901. Accompanying the diagram is a table referring back to high water of 1838, which prompts the conclusion that the water was highest in that year, probably caused by unusual precipitation at that time over the lake region and the watershed tributary thereto.

I have never seen anything on the subject of lake water levels that struck me more forcibly than this chart. Nearly all of the practical men of the lakes with whom I have discussed this subject during several years past are of the opinion that the deepening of channels by the government under present methods tends to permanently lower the water of the lower lakes, and I think this is proved conclusively by the diagram. Without going into a long discussion regarding the high water of 1838 or the diagram as a whole, let me call attention to the fact, shown by the chart, that from 1886 up to the present time Lakes Michigan, Huron, Erie and Ontario have fallen from $2\frac{1}{2}$ to 3 ft., while Lake Superior has risen about a foot in the same period. Up to 1886, a year which probably marks the

beginning of large dredging operations in the rivers, all the lower lakes practically maintained their respective levels with Lake Superior, fluctuating from year to year in accordance with wet and dry seasons, and always highest about midsummer, this latter condition due to causes which it is not necessary to consider here. So it seems to me that a study of this chart certainly confirms the opinion that the deepening of channels through connecting waterways contributes to or even explains in full the fall of the lower lake levels. It is well known that since 1886 large dredging operations have been carried on in the rivers. Beginning with the removal of shoals at the foot of Lake Huron, the work has extended to deepening operations at the lower end of the St. Clair cut and a wide 20-ft. channel has been dredged above Windmill point on Lake St. Clair. Then there has been a continuation of the same kind of work in the Detroit river over a long stretch from Ballard's reef to Bar point, including the extensive Lime-Kiln crossing project. At the lower end of Lake Erie the channel has been deepened into Niagara river and it is well known also that this work has extended on through the St. Lawrence river to tide-water. The great bulk of these deeper channel operations, as well as the Chicago drainage canal with its great flow of water from Lake Michigan, are projects completed within the period to which this discussion relates. During all this lowering process on the lower lakes, Superior has not only maintained its level, but has risen about 10 in., which rise is undoubtedly attributable to the fact that thousands of tons of rock, taken from the reefs above the Sault canal, were dumped at the head of the rapids, filling in and raising the bottom just where the water begins to feel a perceptible drop. Supplemental to this are the railroad bridge abutments in the same locality and a wing dam for the purpose of changing the current in connection with a water power enterprise, all tending to obstruct the flow and thus raise the Lake Superior level. It is not probable that the large power canal at the Sault will cut much of a figure as an offset to the filling in above the rapids; neither will the deepening of the Sault river have any effect on Lake Superior, as the bottom of the river above the rapids is higher than the surface of the river below the rapids, so that if the river below the rapids was entirely dry it would not affect the level of Lake Superior.

In the minds of some people, probably more capable of judging than myself, there may be other influences governing this matter, but during a life-long experience with the lakes my observation has not brought to my mind any other conclusion than that the digging and damming-up processes are the most potent factors in controlling the levels of the great lakes.

Cleveland, Feb. 26, 1902.

THE GREAT DINNER TO PRINCE HENRY.

Probably the most notable event which has marked, or which will mark the visit of Prince Henry of Prussia to this country, was the dinner given to him by the captains of industry in New York on Wednesday evening. The prince met the men who control, pretty thoroughly, the industries of the country. It is really because they are so few that they are so powerful. One thing will strike the reader in reviewing the list—and that is that of several of them he has never heard before. They are silent workers in the inner councils of the industrial world. The hosts were: J. Pierpont Morgan, Morris K. Jessup, Edward D. Adams, George F. Baker, John Clafin, Elbert H. Gary, Abram S. Hewitt, Levi P. Morton, Alexander E. Orr, William Rockefeller, James Stimson, William K. Vanderbilt and L. M. Goldberger of Berlin.

The captains of industry were: Edward G. Acheson, James W. Alexander, J. Ogden Armour, George F. Baker, Alexander Graham Bell, Edward J. Berwind, John S. Billings, E. W. Bliss, Emil L. Boas, Frederick G. Bourne, Henry P. Bowditch, John A. Brashar, Alexander E. Brown, Charles F. Brush, Adolphus Busch, Alexander J. Cassatt, Frank W. Cheney, Duane H. Church, Charles F. Clark, William B. Coggeswell, John H. Converse, Charles H. Cramp, Francis B. Crocker, Charles Deering, Theodore L. Devinne, William E. Dodge, John F. Dryden, James B. Dake, W. H. Dunwoody, Thomas A. Edison, Marshall Field, David E. Francis, John Fritz, George J. Gould, James B. Grant, Clement A. Griscom, James D. Hague, Charles M. Hall, Edward H. Harriman, Henry O. Havemeyer, Marvin Huggett, Julian Kennedy, Samuel P. Langley, Robert T. Lincoln, Johnston Livingston, John A. McCall, John Markle, Samuel Mather, J. R. Maxwell, Charles S. Mellen, Rear Admiral George W. Melville, Albert A. Michelson, D. O. Mills, S. Weir Mitchell, Charles A. Moore, George S. Morrison, Henry Morton, Franklin MacVeagh, Max Nathan, Simon Newcomb, Frederick Pabst, William Barclay Parsons, Edward C. Pickering, Albert A. Pope, Henry S. Pritchett, Michael I. Pupin, Norman B. Ream, Edwin Reynolds, John D. Rockefeller, W. A. Roebling, Henry H. Rogers, Charles M. Schwab, Gustav H. Schwab, Irving M. Scott, Coleman Sellers, Samuel Spencer, Francis J. Sprague, Nikola Tesla, Elihu Thompson, Robert H. Thurston, Herbert H. Vreeland, Charles D. Walcott, Rear Admiral J. G. Walker, George D. Ward, Levi C. Weir, George Westinghouse, Edward Weston, Frederick Weyerhaeuser, P. A. B. Widener.

Financially and industrially, the United States is practically directed by these men.

Stockholders of the National Fireproofing Co. have voted to increase the capital stock from \$5,000,000 to \$12,500,000. The new issue will be \$5,000,000 preferred and \$2,500,000 common. This issue is to provide \$1,000,000 working capital and buy eighteen plants now operated by fifteen companies. Directors were elected as follows: D. F. Henry, F. C. Grier, W. H. Graham, J. J. Booth, T. J. Hamilton, Adams Wilson, Frederick Gwinner, Jr., E. B. Alsop, W. A. Dinker, T. G. McCutcheon, H. M. Keasbey, R. W. Allison, W. D. Henry, J. P. Robbins and C. G. Jones. The officers chosen were: D. F. Henry, president; W. D. Henry, vice-president; R. W. Allison, general manager of sales; W. H. Graham, treasurer, and E. G. Jones, secretary.

A chart of the Detroit river in colors—the best chart of the river ever printed—has just been issued from the Detroit engineer office. It takes in everything from Windmill point to Bar point. All the changes resulting from extensive dredging, shifting of ranges, etc., are very clearly shown, and the corrections are, of course, up to date. This chart may be had from the Marine Review.

ACROSS Isthmus of Darien.

STATEMENT FROM THE AMERICAN Isthmus SHIP CANAL CO., WHICH PRESENTS A CANAL SCHEME INVOLVING A GIGANTIC TUNNEL PROJECT.

In connection with the isthmian canal question, now of leading importance in Washington, the claims of the American Isthmus Ship Canal Co., which proposes to construct a canal across the Isthmus of Darien, will prove interesting, notwithstanding the charge that it is a visionary project for the reason that it involves the construction of a tunnel five miles long, 202 ft. high, 95 ft. wide single way, 180 ft. wide double way, etc. This scheme is being promoted by Gen. Eduard W. Serrell, who has succeeded of late in directing considerable attention to it through the newspapers. A statement recently issued by the company is as follows:

"The American Isthmus Ship Canal Co., incorporated under the laws of the state of New Jersey, on June 30, 1899, proposes to construct and operate a tide-water sea-level ship canal across the Isthmus of Darien, in the Mandingo country, a straight line without locks or tide gates, 29½ miles long, from a good harbor in the Gulf of San Blas on the Atlantic side, nearly south to a good harbor back of the Pearl islands on the Pacific side. Having completed its preliminary work, this company now proposes to show that its enterprise is the ideal canal, and that it alone fulfills the conditions stated by our late lamented president in his inspired speech in Buffalo, on Sept. 5 last, when among the ideals to be sought by the American people he named a straight line of water communication. 'We must build,' he said, 'the isthmian canal which will unite the two oceans, and give a straight line of water communication with the western coasts of Central and South America and Mexico,' and the American Isthmus Ship Canal Co. proposes to ask from the congress of the United States approval of its enterprise.

"It proposes to build and operate the canal itself, under proper supervision, however, of the United States government. It asks no appropriation from the congress. It seeks to take no dollar from the public funds. It asks that the United States government shall guarantee its bonds in principal and interest as the property acquired and work done under government supervision justifies, and it offers as an equivalent for such guarantee free transit for vessels belonging to the United States through its canal for 100 years. The problem of water transit at the isthmus has occupied the attention of the world for a very long time. The best way has been anxiously sought, both by the United States government and by citizens, and long delay has been patiently endured to the end that in such a vast enterprise no mistake should be made.

"The American people feel now that the time for decision has come. They look to the congress for action—final action. The various proposed lines may be generally classified in two groups, the first of which is sea-level tide-water canals, and the second canals depending upon impounded water with locks and tide gates. The advantages of the former are manifest and scarcely need enumeration, while the disadvantages of the latter, both in construction and operation, are equally beyond discussion. It is only necessary to refer to the successive reports of the commissions of recent years to clearly see this point. To depend upon rain water impounded by dams, in a country where every rainstorm is almost a cloud-burst, and is therefore a grave danger to the dam which is expected to contain it, is not desirable. To operate great ships through tortuous channels, to lift them up and down by gigantic locks would, if inevitable, be a most pitiful solution for the twentieth century science to give to a problem, so long discussed, and so vitally important. But if avoidable such a choice is not a solution of the problem, and leaves it open for a better answer. And yet but recently public opinion seemed to trend towards this very thing in the adoption of the Nicaragua route, while the Panama route, which has lately seemed to be growing in public favor, belongs to the same objectionable class.

"The report of the Isthmian Canal Commission, recently submitted, indeed recommends the adoption of the Nicaragua route but purely as a choice of evils. It admits all that has been said above in regard to the fundamental principles that underlie this discussion. There can be no doubt that the commission would have welcomed a straight water way without locks or tide gates as the solution of this question, and have eliminated immediately from the discussion any canal with impounded water and locks if such a line had been before them. It will naturally be asked then how such a line came to be overlooked, for a route in the San Blas region is not a new thought. That such a line offered the shortest distance between the oceans, that it possessed perfect natural harbors, that it could be made at sea-level, were facts within the knowledge of the commission, and a reference to their report will show a description of such a line and a discussion of its merits. It will there be seen that the commission preferred both the Nicaragua and Panama locations, considering the tunnel of San Blas more objectionable than the complicated system of locks and tide gates, dams and lakes of Nicaragua and Panama. The commission, however, made the line they illustrate in valley locations, necessarily involving curves and radically objectionable from our point of view, and in a country of violent rainstorms, while their tunnel, both in design and cost, is far inferior to the Mandingo tunnel which we advocate and which we claim to be the ideal solution of the canal problem.

"It will be asked why the American Isthmus Ship Canal Co. did not bring its line to the attention of the commission. The answer is, first, the commission was appointed to discover and describe a canal route to be owned and operated by the government of the United States; this was not and is not our purpose. Second, and far more important, is the fact that not until the deliberations of the commission were practically closed had we completely located our straight line, and demonstrated to ourselves and to the eminent scientific gentlemen whom we consulted the feasibility and economy of our tunnel plans.

"When this point had been reached we laid the matter before the president of the United States, who referred it to the commission, whereupon we sought and obtained an interview with Rear Admiral Walker, the president of the commission, who together with Prof. Burr, expert engineering member of the commission, saw our plans, maps, and drawings, and desired that they be exhibited to Mr. Morison who was charged by the commission with the investigation of the group of projected routes of which ours is one. Mr. Morison up to the present time, however, has not found it convenient to call upon us. We are confident that when Mr.

Morison shall have seen our plans and communicated with his colleagues the commission will make a supplementary report to congress which will clear away any doubt as to the preference due to our canal.

"It must be already apparent from the facts above stated, and from the report of the commission, that the only point in our plans open to discussion is the tunnel. But does the tunnel really present an objection to modern science and to present mechanical devices, whatever may have been the case at an earlier period of the inquiry? The answer is most emphatically no. By existing appliances, by means of machinery now in the market and in successful operation, this tunnel can be quickly and economically built, and with certainty and safety, economically operated. It is a work, says an eminent authority, 'not of difficulty but of magnitude,' and when it is recollect that its magnitude is insignificant as compared with the engineering work involved in plans of its competitors, it will, we think, be apparent that the tunnel is no real objection to the line. We have exhibited our studies for this tunnel to eminent engineers and have received the most flattering endorsement, which will in due time be made public, and we shall show that experienced and responsible contractors are willing to build our canal within our estimates, and to give satisfactory bonds to that effect. We are of opinion that although full faith and credit should be given to the opinions of competent engineers, the cost of an enterprise can never be certainly fixed until responsible contractors have named the price at which they will undertake it. The following are the points upon which the Mandingo route depends for approval:

1. Its length is but 29½ miles.
2. It is a perfectly straight line from ocean to ocean.
3. It possesses perfect natural harbors, large enough and deep enough for commerce.
4. It has no locks nor tide gates nor dams, but is essentially a part of the water system of the world, where shipping can pass without hindrance or delay.
5. It does not depend upon impounded water with all the contingencies involved in such dependence, but becomes on the contrary, from the moment of its completion, a portion of the ocean.
6. It can be constructed ready for operation in not more than three years.
7. Its capacity, under all conditions of tide and weather, allows the passage of 288 ships per day under a headway of one mile.
8. Electric trolleys will propel shipping through the canal with certainty, regularity and safety.
9. The time of transit for steamships under their own steam in the open cuts, and by trolley through the tunnel, will be 3½ hours; for ships not using their own motive power the time by trolley towage will be 5 hours.
10. The distance to and from all South Pacific ports is shorter, and the time needed less. To all North Pacific and insular ports the certainty and rapidity of transit will give it a time advantage which more than balances its slight disadvantage in distance.

"Finally the American Isthmus Ship Canal Co. asks no money from the treasury of the United States. It proposes to give to the commerce of the world ideal transit from ocean to ocean at a moderate and just price, and to the government of the United States in exchange for the guarantee of its bonds free transit for 100 years for the national ships.

"Such are some of the meritorious features of our enterprise, and for these reasons we ask the approval of the congress and the American people. That so long a discussion should be ended by a choice of evils would be most unfortunate, and we most respectfully ask that our enterprise be given careful and unbiased consideration and investigation in full confidence that the result will be the approval we seek."

PETER WHITE FOR MAYOR OF MARQUETTE.

The Mining Journal of Marquette, Mich., has this to say of the Hon. Peter White, of whom the Review lately had the pleasure of publishing a somewhat extended biographical sketch:

"The Hon. Peter White will be a candidate for mayor at the approaching spring election, and in all probability he will be accorded the signal honor of a unanimous nomination. Among the citizens generally there has for some time been a feeling that it was but fitting that Mr. White should be tendered the highest place in the gift of the municipality, and that aside from being 'Marquette's first citizen,' he should be its executive head as well. This sentiment crystallized until finally the gentleman was a few days ago waited upon by a delegation of prominent residents and at their earnest solicitation consented to the use of his name in connection with the mayoralty. It was fairly well known about the city yesterday that Mr. White had agreed to be a candidate for the nomination, and in all quarters the news was received with elation. In fact, the uniform opinion expressed to the Mining Journal was that in view of the superior merits of Mr. White and in consideration of his great services in furtherance of the interests of the community there would be no opposition and that he would be the nominee, not of any particular faction but of the entire rank and file of the electors as a body. There is no question that Mr. White is extremely popular with all classes, and that any opposition would count but little against him, but it is gratifying to note—as far as the Mining Journal could ascertain—that it is the general sentiment the nomination be made a unanimous one. In no quarter could there be gleaned a manifestation of any intention of placing an opposition candidate in the field, and all the talk concerning the probable candidacy of other gentlemen, heard before the news of Mr. White's determination was known, was silenced. Mr. White's manifold services in the interest of the city are too well known to necessitate elaboration here. It is enough said that there has been no project or work which would add to the importance of Marquette in which Mr. White has not been a prime mover, and now that the people are to have the chance to show their appreciation of his great good the desire to make him the sole mayoralty candidate is gratifying and appropriate."

The International Correspondence Schools, Scranton, Pa., have just issued a catalogue devoted to navigation and defining their courses of study for ocean and lake navigation. The catalogue is quite complete. It is both clear and thorough. It might be well for any one desiring to take a course in navigation to send for this catalogue.

NAVAL DEVELOPMENT IN THE PAST DECADE.

BY REAR ADMIRAL GEORGE WALLACE MELVILLE, ENGINEER-IN-CHIEF OF THE UNITED STATES NAVY.*

Probably the four most significant events in the nation's history during the past decade have been the satisfactory solution of the financial question, our remarkable industrial expansion, the acquisition of the Philippines and the rapid development of the navy. Not only our own thoughtful people, but also our continental neighbors have been impressed with our action in these matters, and as a result our relative military and industrial standing has greatly advanced.

Our progress in securing the front rank in financial credit; our ability to hold the home market as well as to successfully compete in the foreign field; our rapid colonial extension, and our success in virtually obtaining the command of the waters of North America, have forced us into a position as a world power. It is not only our right to extend our trade, but it is our duty to prevent foreign markets from being unjustly taken away. We must never forget, however, that prosperity and success produce rivals and incite the jealous to opposition. They, therefore, bring new responsibilities, and it is certain that in order to hold on to what we have secured through conquest or industrial superiority we must maintain an armed force of sufficient strength to manifest our readiness and ability to protect commercial rights and privileges.

Only by right, and not by might, will this nation fulfill her highest destiny. For all time the thought should be dispelled that increased material prosperity can be maintained by conquest. It should ever be kept in mind, however, that those countries which are rich in natural resources, but wherein there is no martial spirit, are always the objects of attack and conquest. It is as essential to be in readiness to restrain by military and naval forces the foes that are beyond the boundaries of a country as it is to effectively control, by a local police, the turbulent within a community.

In this age of strenuous life and action war can only be averted by those nations which are in condition to resist aggression. The best guarantee for peace is military strength and preparedness. Our environments are such that no nation would dare to attack us except from the sea, and, therefore, the navy must constitute the first line of defense from a foe. We don't require a navy great enough to attack the coast of any continental power, but we do require a fleet of battleships that could quickly prevent an enemy reaching our shores. Since the navy should be too large rather than too small, it should be regarded as a weapon rather than a shield, for the exigency might arise when it would be necessary to seek the enemy's shores. If maintained to a strength sufficient to be used only as a shield, it would not be long before the navy might be compelled to retreat from its position off shore and seek the shelter of the harbor batteries.

The question of the development of sea power has always been an attractive one. There is a wonder and romance to the sea which makes everything pertaining to the ocean of absorbing interest. The element of danger is never removed from those who go down to the sea in ships, and as the scene is ever changing, the subject is always of interest. It will be remembered that the navy has always kept in close touch with the people, and has never been used in the suppression of liberty. Despotic as may be the organization of the individual war ship, there is a spirit pervading the service that keeps the navy in sympathy with the purpose of the great mass of the community. Life on the deep is a busy, stirring and invigorating one, and the spirit of unrest and anarchy has never secured a firm footing in any naval service.

With each succeeding year new and powerful forces are arrayed in favor of increasing the navy. It is inevitable that there will be a progressive and rapid development of the naval organization during the next decade. By briefly mentioning some of the elements that are back of the movement to advance our relative naval strength one can best realize how certain we are to advance in standing as a sea power.

Probably the strongest force arrayed in behalf of a greater service is the attitude and action of the general press. Fortunately for the interests of the nation the question of increasing the navy is not a political one. Its augmentation is urged as vigorously in the south as it is in the north. In demanding that the complement of war ships be increased the people of the Pacific coast are as enthusiastic on the question as those living on the Atlantic. It is a happy coincidence that there is a keen desire everywhere for information relating to the construction, organization and use of the battleship. Many writers now find the subject a profitable field for the employment of their literary talent, since there is a commercial value to news pertaining to the naval service. The several thousand daily papers and the hundreds of magazines and periodicals are almost a unit in urging the congress to give more men and more ships to the service. The press is, therefore, a mighty force in working for a larger navy.

The subject meets with such approval that it is now an interesting and leading topic of the lecture field. By means of lantern slides and interesting descriptions of war ships addresses upon the navy are exceedingly popular. The war ships in themselves are also powerful educators in influencing public sentiment as to the necessity for an increased naval establishment. It is safe to say that during the past four years hundreds of thousands of visitors have been shown over the battleships and have been told of our naval needs and necessities.

There are a dozen naval stations and navy yards which are centers of influence for creating an interest in the organization. The mechanics at these stations have allied themselves with organized labor, and as a result the congress of the United States receives hundreds of earnest and powerful petitions urging the construction of war ships at the navy yards. At least ten ship building firms in this country can build battleships and armored cruisers, and some of these establishments have a literary bureau for creating public interest in war ship construction. Over fifty firms can build gunboats, and hundreds can manufacture naval stores and supplies. All these firms have a selfish, if not a patriotic interest, in the enlargement of our fleet, and in the past these forces have been quite powerful factors in helping us to secure more war vessels.

The army of tourists and commercial travelers who annually visit Europe return to America strong believers in a larger navy. The influence of these classes is very great, and has made itself felt upon this question in

the halls of congress. The commercial and maritime associations of the leading seaports have also done effective work in aiding us to secure a larger navy. These organizations have correspondents in every section of the country, and the indirect aid extended has been greatly appreciated. The shipping interests particularly are interested in the movement, for the friends of the merchant marine fully understand that a fleet of battleships paves the way for the formation of a line of merchant steamers.

As to the attitude of the administrative officers of the government upon this question, every secretary of the navy and president for the past twenty years has urged the progressive development of this branch of the military service. They have personally visited the ships, and also urged the creation of a naval reserve. The annual appropriation for the naval service has gradually increased, till now it is over double and nearly treble what it was five years ago. For the next fiscal year, including public works of a naval character, Secretary Long has submitted estimates calling for an appropriation of practically \$100,000,000. The secretary has been an extremely conservative administrator, and the naval needs must have been very urgent, otherwise he would not have recommended an appropriation of such character. The president has indorsed in its entirety the budget submitted by Secretary Long. There has been no chief executive whose knowledge of naval affairs has been so thorough as that possessed by Mr. Roosevelt, for only a few years after leaving college he wrote a naval history of the war of 1812 that has long been regarded as one of the best upon the subject. His appointment as assistant secretary of the navy was, therefore, to his particular liking, and while in that office he learned fully of our needs. If the estimates submitted by Mr. Long had been in any way excessive the matter would hardly have escaped the attention of the President.

The naval estimates have been received with such favor that it is exceedingly probable that the congress will even increase the appropriations urged by the navy department.

It is neither wise nor necessary to set our standard of naval strength by that of any other power. No nation should be regarded as a probable foe, but all are commercial rivals. The history of the world shows that every commercial rival is also a possible foe, for nations will rush to arms in defense of maritime and commercial rights sooner than they will for almost any other cause.

One need not possess a great military mind to realize that now we are in possession of the Philippines it will be near those islands where we shall have to fight our future decisive battles. It is there of necessity where we are weak, and it will take many years to strongly intrench ourselves in that locality. There is already a cry of "Asia for the Asiatics." It is certain that we must eventually renounce all sovereignty of the Philippines or else prepare ourselves to hold these islands against an efficient naval power whose base of operation may be much nearer than our own. It is a fact that once a nation acquires territory the flag is never hauled down except at a loss of military prestige and commercial influence. We are going to maintain a protectorate over this littoral beyond the Pacific for some time, and a strong navy is the first requisite of this responsibility and duty. We should establish in some harbor in the Philippines large engineering shops, where machinery could not only be built and repaired, but where war ships could be docked and built. For the past three years the private docks in China and Japan have been reaping a financial harvest in the repair of our ships, and military reasons demand that we should not continue to strengthen these establishments in this way.

The defense of the Philippines is but one of the many reasons why we should have an increased naval establishment. Within ten years an inter-oceanic canal connecting the Atlantic and Pacific oceans should be well under way, and no matter at what point it is cut it will require a strong navy to insure its safety and neutrality when completed. Such a canal is a military necessity even though the final cost should run up into the hundreds of millions. Such a canal would help guarantee peace since it would permit us to move our fleets quickly from coast to coast. It will be a paying investment in the end to do the work. The canal can certainly be built for half what it cost England to overcome the Boers. Anything, therefore, which will avert war is worth paying for.

We are bound to advance in relative naval strength, for it is more than probable that before the end of the decade we shall rank next to England as a seagoing power. Some exigency may compel us to suddenly increase our naval strength, and if industrial and commercial reasons justify the purchase of steamship lines, it may be pertinent to ask why we may not be compelled to make a wholesale purchase of war ships from some nation that has greater temporary need of gold coin than steel guns. Just previous to the Spanish-American war we were ready to purchase anything in the shape of war material that could be bought, and it is not at all improbable that some of the surplus millions in the treasury may go to the purchase of foreign warships. It may be that there is no precedent for such action. This nation, however, is going to care less for what has been than for what may be. To maintain its position as a dominant world power it will make precedent. The financial condition of several countries is such that they will have to dispose of some of their most promising assets, and it may be that we can make for the peace of the world by suddenly augmenting our naval strength in this manner.

Progressive development will not only be made in the direction of building more ships, but advance will take place along the line of making each vessel more formidable. Improvement will be evidenced everywhere, but in several particular respects marked progress will be noted.

There will be a noticeable gain in the speed construction of war ships. Up to the present time it has taken five years to design and build a war ship, for in no instance has the modern battleship been commissioned in less than five years from the time she was authorized. Since several of the navy yards are now in condition to build the largest type of war ship, the private firms are going to be spurred on to faster work in the completion of war vessels. Unless individual establishments expedite the construction of naval work, the government may undertake the task of building its own war ships. The nation which is superior in speed construction possesses an important military advantage, and with our great resources we should be second to no nation in this respect.

The progressive improvement that has been made in the character of

*Reprinted from the Philadelphia Record's series of articles on "Public Men on Public Questions."

armor will continue. We have two establishments which can turn out armor of all descriptions, and there is every prospect that at an early day a third firm will compete for this work. It can also be expected that not only will the capacity of the plants be enlarged, but that means will be found for making the armor more rapidly. It should also be possible to fit the armor to the hull more simply and expeditiously, and this will assist in lessening the time of speed construction.

It is highly probable that there will be a change in the size of the main battery of the war ships. The large gun has had its day. There is no evidence that any material damage was done to any Spanish war ships at the battle of Santiago by our 12-in. guns. In that engagement the conditions for using large guns were exceptionally favorable. The 12-in. gun is too heavy, long and cumbersome for existing needs. It is to be hoped that we will take the initiative in designing a battleship whose main battery is not over 10 in. The 10-in. weapon of today is capable of more effect than the 12-in. gun of five years ago, and this is due to the fact that we now possess a safer and more powerful explosive, a more reliable breech mechanism and a handier gun mount. As it is not likely that heavier armor will be placed on board the war ship, and as the gun has always kept in advance of armor, we can secure the best arrangement of battery by the installation of smaller weapons.

There is a phase to the armor and gun controversy that has not yet been investigated to the satisfaction of naval engineers, although these expert officers have called attention to its importance. I refer to the indirect damage that will be wrought by the impact of every 8-in. or larger shell upon striking the armor belt. There are at least one hundred separate steam cylinders or motors on board every war ship. There are miles of piping and electric conduits. There are scores of bearings and supporting brackets for piping. There are innumerable joints of various descriptions, also many electric junction boxes. The impact of several good-sized shell upon the armor protecting the machinery compartments will undoubtedly put out of use some important auxiliaries. It will not be necessary for the shell to explode within the vessel to put the war ship out of action, for the shock, transmitted by the projectile striking the armor, will cause some machine of importance to the fighting efficiency of the vessel to be seriously impaired.

Structural and machinery steel will withstand strain and pressure, but it will not resist shock. The impact of the projectile upon the armor will be transmitted to a greater distance than is anticipated. It is more than probable that the most serious damage inflicted will be found in compartments other than in those whose armor has been hit. Damage will not only be done to the auxiliary connections, but it is extremely probable that some sections of the hull riveting will be greatly impaired. Experience has already shown that these rivets can be easily sheared by shock. If the hull armor of any war ship gets much pounded from 8-in. or 10-in. shells it may not be necessary for the projectile to burst within the ship to cause the vessel to sink, for rivets will be sheared, seams will be opened, and possibly the outboard valve chambers loosened. In short, the naval engineer of today is much more concerned as to what will be the indirect rather than the direct damage inflicted by modern ordnance upon striking the armor of a modern battleship.

By reason of reducing the weight of the battery and armor, there will be opportunity afforded to increase the efficiency and reliability of the propelling and auxiliary machinery. By making some of these parts heavier the liability to accident and derangement will be greatly lessened. The use of electricity will be extended, particularly for motors which do not require much power. It can be expected that the steam turbine will be successfully installed in small gunboats and torpedo boats. An approved type of water-tube boiler and an economical installation of engines of American design will have been adopted, and thus it will be possible for the future battleship to steam much more efficiently. The use of such steam generators will also permit the vessels to get up steam more quickly, and thereby increase the fighting efficiency of the ship. The standardization of auxiliaries will have been accomplished, and, therefore, the fleet will be more self-sustaining in regard to repairs.

The triple screw will be in general use in all strong navies, for economic, structural and tactical reasons will compel its adoption in war ships. It can also be expected that a satisfactory system will be devised for burning crude petroleum with economy and reliability. The burning of this incomparable fuel will be so perfected that it will be possible, when necessity arises, to force the combustion from 50 to 75 per cent., thus giving the commander of the war ship the power to obtain maximum speed in very short time.

Even in the direction of the personnel will there be an improvement. Ever since the beginning of a steam navy there has been a tendency to demand increased intelligence and skill from every one attached to a war ship. It was recently remarked by a very capable and distinguished British naval captain that drunkenness has decreased in the naval service proportionately to the enlargement of the machinery plant. In explanation of this statement he said that no commanding officer would rest content to go to sea with a dissipated crew, particularly if their duties related to the machinery portion of the vessel. With this higher skill has come higher pay, and thus a better class of men is progressively being secured.

ORGANIZATION OF LACKAWANNA STEEL CO.

Details of the plan for enlarging the Lackawanna Iron & Steel Co. have just been made public in a circular to the stockholders. The circular states that it is proposed to organize the Lackawanna Steel Co. under the laws of New York with a capital of \$40,000,000 of which \$20,000,000 is to be set aside to acquire the present outstanding stock of the Lackawanna Iron & Steel Co. Share for share \$5,000,000 is to be held in the new company's treasury and \$15,000,000 is to be offered to holders of the old stock at par to the amount of 75 per cent. of their old stock. According to the circular \$10,000,000 of the \$15,000,000 has already been subscribed for subject to this option given to holders of the old stock which expires on March 1.

The Humbird Lumber Co., Spokane, Wash., has given a contract to the Union Iron Works, San Francisco, for a steamer 120 ft. long to be used on the Pend d'Oreille lake and river.

The new plant of the Wellman-Seaver Engineering Co., Cleveland, is now practically completed and will be in operation in a short time.

MR. J. ISRAEL TARTE ON CANADIAN DEVELOPMENT.

Mr. J. Israel Tarte, Canadian minister of public works, recently made an address at Montreal, in which he predicted that that city would eventually have 1,000,000 inhabitants. He preached the gospel of transportation. He regretted exceedingly that so little of the great commerce of the lakes was finding its way to the sea through Canadian routes. While Buffalo has forty-five elevators, Port Colborne has none to speak of, but he promised that she should have elevators within two years. He claimed that when he took charge of the department of public works the port of Montreal was a wreck. Since then a great deal has been done and he assured the people that it would be carried on to completion, elevators and all. He predicted that Montreal would have a dozen elevators. The crop of the Canadian northwest for 1901 had been 100,000,000 bushels and when this quantity had been produced by comparatively few farmers the minister asked what the result would be ten years hence when hundreds of thousands more are tilling the soil. Mr. Tarte declared strongly in favor of Canadian bottoms to carry Canadian freight. "We are to be a nation," said he, "or we are not, and if we are to be one we must be masters of our marine." He wanted to know how Americans could be given privileges in Canadian waters which they refused to Canadian vessels in their own.

"If I were a private member of parliament," continued Mr. Tarte, "I would say that it was the duty of the government to encourage Canadian ship building just as we have encouraged the manufacture of iron and steel."

Mr. Tarte then took up the question of the French river route, saying that it was the straight route between the east and west, adding that it was essentially a navigable river, being 40 ft. and in some places 100 ft. deep. He thought the cost of the French river improvements would not exceed \$5,000,000, thus giving a 20-ft. channel from Georgian bay to Lake Nipissing. After showing the advantages of the Canadian route in point of distance, Mr. Tarte said he had been accused of favoring the Canadian Pacific railway. "Indeed, I do," he declared, "because it is an essentially Canadian railway," and then Mr. Tarte uttered words of warning to the people regarding the possibilities of American capital securing control of Canadian railways. "They may buy our railways," he said, "but they cannot buy our canals and waterways. If we want to be a free nation we must be careful, and we will be a free nation while the British flag waves over us. We must not sell our birthright for a mess of pottage. Let us not give the Americans all we possess. I favor the Canadian Pacific railway because it is the only road that crosses this continent on Canadian soil, and I believe in the French river route, because it is a Canadian route pure and simple."

Mr. Tarte then took up the recent action of the Canadian Pacific railway directors, which had been approved by the Canadian government—the increase of the capital to the extent of \$20,000,000. Supposing that stock, he said, had been placed on the open market, it would have been quite an easy matter for Mr. Morgan and his allies to secure the whole. Then the speaker said that as a matter of fact, the time might come when the Canadian government would have to do with the Canadian Pacific railway what the British government did with the Suez canal. The British cabinet, he added, had secured the Suez shares to safeguard imperial interests, and a similar patriotic policy might some day prompt the government of Canada. "There is no danger now," he added, "but one can never tell what the future may bring forth."

Mr. Tarte went on to say that if Canada spent \$20,000,000 in a further improvement of its inland waterways it would not be at all extravagant in view of the future possibilities of the dominion. The French river, he declared, could be completed in two years and he announced that a 30-ft. channel would also exist from Crane island to Montreal, the channel between Montreal and Quebec to be 450 ft. wide in the straight sections of the river and 500, 600 and 700 ft. in the curves. Mr. Tarte said that was his program, and one which he believed would be supported by the business men of Canada.

Mr. Tarte was also favorable to the equipment of Sorel, Three Rivers and Quebec, as Montreal in the near future would not be able to handle all the traffic that was sure to come. As for Capt. Wolvin, he said he hoped that gentleman would succeed at Quebec. He had asked for things at Montreal that could not be accorded, and the government was especially in accord when it refused to allow American bottoms to trade between Canadian ports. Mr. Tarte said that Quebec owed the government of Canada \$5,500,000, and no interest was being paid, yet it had no ill-will toward Quebec. Last year, Mr. Tarte said, the export and import trade of Montreal reached \$133,000,000, while that of Quebec was \$10,000,000, so there is not much danger of Montreal losing its supremacy among the cities of the St. Lawrence. Mr. Tarte said that Capt. Wolvin could navigate between Duluth and Quebec, and the department would do all it could for him, but he did not think a great deal of grain would pass Montreal for shipment at Quebec, when the national port of Canada was properly equipped to receive it. Quebec, he added, would probably be the winter terminus for the fast Atlantic steamship line, and no one would begrudge the prosperity that will come to the ancient capital as well as to the other ports on the St. Lawrence river.

At this stage the minister became a little wild in his statements. "Our American friends," he declared, "are making tremendous efforts to crush this country. We who are in office know that they are leaving no stone unturned to crush this dominion, both industrially and commercially. They are making combines on land and on sea against us, and if we have a shorter route to the seaboard than they have, it is our imperative duty to make it the cheapest and best, even if we have to spend \$20,000,000 in doing so. I have been accused of talking too much, but I may tell you that it is never a crime to speak the truth, and I do not believe in secrecy in public affairs. There is a crisis at hand. Our American friends are endeavoring to make a slaughter market of this country. In consequence of this attempt let us have a tariff that will protect our national industries, and waterways that will protect our national trade. It was said that we would destroy everything, but we have built up instead. Circumstances alter cases. It is a bad policy to tinker with the tariff, but I hope that the business men of Canada will realize that we will do our duty both in transportation and tariff matters, for the former is the complement of the latter."

NEW STEEL WORKS.

Open-hearth and steel plants projected and under construction by various independent steel interests throughout the country will increase the open-hearth steel production of the United States not less than 5,000 tons per day. This is equivalent to a production of over 1,500,000 tons per year and is an indication of the vast increase in the use of open-hearth steel in this country. Further, the fact that this increase in capacity is being provided for by interests outside of the United States Steel Corporation shows that the independent producers are already alive to the fact that to insure the constant operation of their plants they must provide a means of securing their raw material. Never in the history of the American iron and steel trade has there been under construction or planned at one time steel plants of so great a capacity. Nor has the planning of open-hearth plants ceased, as a number of independent steel interests, notably the newly organized independent sheet manufacturers' association is contemplating the erection of a plant to provide sufficient raw material for all the plants in the association. Inasmuch as the open-hearth plants can be operated on varying quantities of ore, pig iron and scrap material, there is little possibility of cutting off the supply of raw material from these plants. While old material has slightly advanced in price of late, due to the general advancing iron and steel market, there is little doubt that the market will continue strong on account of the increasing demand for this material for open-hearth purposes. In addition the ore interests not controlled by other producers of steel will be amply able to supply the furnace capacity required for these open-hearth plants.—Iron Trade Review.

AROUND THE GREAT LAKES.

Another steel steamer for J. C. Gilchrist and others of Cleveland will be launched Saturday at the Lorain works of the American Ship Building Co. The vessel will be named C. W. Watson.

John C. Silva, grand captain, and Benjamin F. Perkins, captain's clerk, national officers of the American Association of Masters & Pilots are visiting local organizations on the lakes. They were in Cleveland Thursday.

Stockholders of the Upson-Walton Co. met on Wednesday of this week and elected the following officers: J. E. Upson, president; H. F. Lyman, vice-president; C. R. Doty, secretary, and J. W. Walton, treasurer. Mr. E. B. Babbitt was added to the directory.

Mr. C. O. Duncan, general manager of the Port Huron & Duluth Steamship Co., which operated the steamer Spokane last season between Port Huron and the head of Lake Superior, has chartered two medium sized steamers for the coming season for the Duluth-Port Huron trade.

Bateman, McDougall & Palmer, who have built up at the foot of Genesee street, Buffalo, within the past two years, quite a large business in vessel repairs, are still making extensive additions to their plant, which is very well equipped for work on steel as well as wooden vessels. This firm is now engaged, or has been engaged since the close of navigation, on repairs to as many as thirty large lake freighters. They have recently leased additional water front property and now have about 750 ft. A new machine shop will be erected in the spring.

A change is announced in one of the well known admiralty law firms of Detroit. Charles B. Warren, until recently the second member of the firm of Dickinson, Warren & Warren, has withdrawn from that firm and has entered into a co-partnership with John C. Shaw, Byron S. Waite, William B. Cady and Herbert K. Oakes of the firm of Shaw, Waite, Cady & Oakes. The firm name has been shortened, for convenience, and a general law business will be done under the name of Shaw, Warren & Cady. Mr. Waite will assume the position of counsel to the firm, and Mr. Oakes will give special attention to admiralty practice.

Another vessel from the Atlantic seaboard will be brought to the lakes next spring by Clergue interests of Sault Ste. Marie. The vessel is the Montauk, one of the Long Island sound passenger boats. On the lakes she will be operated in connection with the Algoma Central railroad. She has accommodations for about 100 passengers. She was built in 1891 by the Harlan & Hollingsworth Co., Wilmington, Del., and is 190 ft. long, 31 ft. beam, 9.6 ft. depth of hold, and of 570 gross tons. Her width over the guards is 50 ft., which will mean that there will be some difficulty experienced in getting her through the Canadian canals, the smallest locks being only about 45 ft. in width.

CUYAHOGA CONTRACTING CO.

This is a new Cleveland concern, that will shortly prove quite a factor in contracts for public works, as well as in all kinds of dock work, dredging, pile driving, steel and concrete bridges, piers, submarine work and wrecking. The company's first contract is one amounting to about \$90,000 and involves the construction for the city of Port Huron of a canal for sanitary purposes that is to run from Lake Huron to Black River. This canal will be 5,800 ft. in length and 25 ft. at the bottom, carrying 6 ft. of water.

Officers of the company are: R. K. Pelton, president; Thomas E. Young, vice-president; B. P. Faragher, secretary and treasurer, and R. Rosenstock, chief engineer. Mr. Pelton represents extensive capital available for the new company. Mr. T. E. Young is in charge of the coal business of M. A. Hanna & Co. Mr. Rosenstock, the chief engineer, is the practical head of the concern. Mr. Faragher is also an engineer. Offices of the company are in the Rose building, Cleveland. A pile driver, now under construction for the company, involves several unique features, and, it is claimed, will be the best device of its kind on the lakes. A wrecking outfit, to be built at once, will be of 300 tons capacity. All appliances planned by the company are to be modern in every way.

The United Telpherage Co., Nos. 20-22 Broad street, New York, has issued a little catalogue devoted to telpherage as applied to docks, pier sheds, freight stations, warehouses, store yards and the conveying of miscellaneous freight. It will be sent to any one who writes for it.

For navigation charts apply to the Marine Review.

OFFICERS OF LAKE VESSELS FOR 1902.

(Continued from page 17.)

MONROE, THOS., Muskegon, Mich.	
Str. G. C. Markham..... Capt. A. Christensen .. Engr. A. Smith.	
Schr. L. M. Davis..... " H. Hermanson.	
SHARP, W. H., Bay City, Mich.	
Str. J. P. Donaldson.... Capt. Jas. Connally Engr. John Fettig.	
Schr. A. W. Wright.... " Thos. Thorkildsen	
FRANCOMBE, J. A., Detroit.	
Str. W. R. Stafford..... Capt. B. C. Chamberlain Engr. J. A. Francombe.	
Schr. Ed. McWilliams . " Alex Sharron.	
CHARLEVOIX LUMBER CO., Charlevoix, Mich.	
Str. Pine Lake Capt. Eph. S. Small.... Engr. John Chemock.	
Schr. Naiad " Chris. Edwardson.	
ERICKSON, CAPT. JAMES, Managing Owner, Milwaukee.	
Schr. Lake Forest Capt. Jas. Erickson.	
" Hattie Hutt " Martin Mathison.	
CROSBY TRANSPORTATION CO., Muskegon, Mich.	
Str. Nyack Capt. Chas. A. Lyman.. Engr. Carl Halberg.	
" Naomi " Thos. Trail " A. A. Green.	
MYLES TRANSPORTATION CO., Ltd., Niagara Falls, N. Y.	
Str. Myles Capt. J. S. Moore..... Engr. C. J. McGorley.	
RARDON, J. J., Chicago.	
Str. Phenix Capt. E. C. Vanpatten.. Engr. Wm. Frazier.	
LITTLE, JOHN, Port Huron, Mich.	
Str. George Dunbar ... Capt. John W. Little... Engr. John S. Brown.	
HURLEY, T., Detroit.	
Str. Majestic Capt. M. G. McIntosh.. Engr. T. J. O'Connor.	
ALGER, SMITH & CO., Detroit.	
Str. Gettysburg Capt. Wm. Jagenow ... Engr. Wm. P. Wenner.	
BLODGETT, W. C., Buffalo.	
Str. Joseph Capt. Frank Conlin Engr. J. A. Braman.	
BIGELOW BROS., Chicago.	
Str. Madagascar Capt. John Jenks Engr. Chas. Nerreter.	
BROWN STEAMSHIP CO., H. H. Brown, Prest., Cleveland.	
Str. Castalia Capt. C. C. Allen..... Engr. E. E. Dempsey.	
CANDLER, H. & J., J. W. Candler, Mgr., Detroit.	
Schr. Senator Capt. Chas. Anderson.	
DRIESKE & CO., WM., Chicago.	
Schr. Ralph Campbell.. Capt. Peter Hansen.	
FARWELL, J. H., Detroit.	
Str. J. H. Farwell..... Capt. J. A. Duncanson. Engr. John Johnston.	
GREEN, JOHN, Buffalo.	
Str. Lewiston Capt. D. F. McKenzie.. Engr. James Green.	
HARLOW, W. J., 706 Madison St., Toledo, O.	
Str. Harlow Capt. W. J. Harlow.... Engr. N. M. McNamara	
SEITHER TRANSIT CO., R. W. England, Mgr., 961 Third Ave., Detroit.	
Str. G. J. Grammer..... Capt. R. W. England... Engr. Geo. B. Milne.	
SEITHER, FRANK, R. W. England, Mgr., 961 Third Ave., Detroit.	
Str. V. H. Ketchum.... Capt. Ed. D. Gatfield... Engr. John J. Booth.	
FOSTER LUMBER CO., Milwaukee.	
Str. Normandie Capt. Wm. Ingalls Engr. Hiram Fuller.	
WELLS, E. L., Port Huron, Mich.	
Schr. Hattie Wells Capt. Sylvester Ray.	
GRAND ISLAND STEAMBOAT CO., St. Albans, Vt.	
Str. Reindeer Capt. Wm. Newton Engr.	
McCORMICK, H. W., Bay City, Mich.	
Schr. Oneonta Capt. Patrick Gordon.	
MILLER, J. B., Toronto, Ont.	
Str. Seguin Capt. J. B. Symes..... Engr. Ed. Welch.	
PEDERSON, K., Tonawanda, N. Y.	
Schr. Commodore Capt. K. Pederson.	
ROBY TRANS. CO., L. C. Waldo, Mgr., Detroit.	
Str. L. C. Waldo..... Capt. J. W. Duddleson.. Engr. N. E. Allen.	
UNITED STATES & ONTARIO STEAM NAV. CO., Wm. Wollett, Mgr., Conneaut, O.	
Str. Shenango No. 1.... Capt. R. R. McLeod... Engr. E. Wood.	
STEWART TRANSPORTATION CO., A. E. Stewart, Mgr., Detroit.	
Str. C. F. Bielman..... Capt. Fred Stewart Engr. Robt. Lacey.	
ROBERTSON, GEO., Grand Haven, Mich.	
Str. Sidney O. Neff..... Capt. Geo. Robertson .. Engr. Frank Greilick.	
ASHLEY & DUSTIN, Detroit.	
Str. F. E. Kirby..... Capt. A. J. Fox..... Engr. H. L. Lewis.	
S. W. TRANSIT CO., Chas. T. Williams, Mgr., Cleveland.	
Str. A. C. Lindsay..... Capt. C. H. Woodford.. Engr. C. Burns.	
BYRON WHITAKER, Detroit.	
Str. B. Whitaker Capt. L. Jones Engr. D. W. Blauvelt.	
MEYER, W. H., Milwaukee.	
Str. Christopher Capt. W. E. Wright.... Engr. S. Pratt.	
KING, A. B., Port Huron, Mich.	
Schr. F. M. Knapp..... Capt. A. B. King.	
FARR, M. E., Managing Owner, care Detroit Ship Building Co., Detroit.	
Str. Yosemite Capt. John T. Hutton.. Engr. Jno. W. McClure.	
SYLVESTER BROS., Toronto, Ont.	
Schr. St. Louis Capt. Geo. Williamson.	

LARGE FLOATING DRY DOCK FOR BERMUDA.

Messrs. C. S. Swan & Hunter, Ltd., Wallsend-on-Tyne, England, launched last week the great floating dry dock for Bermuda, the largest ever built in Great Britain. It will replace the old floating dry dock that has been in use in Bermuda since 1869 and which has now become obsolete, not through age but through the insufficiency of its dimensions. The length of the old dock was 381 ft. over all, but to obtain its maximum lifting power gates were fitted which reduced its practical length to 330 ft. The new dock is 545 ft. long and having no gates the length of ship it can take is not restricted. Its clear width of entrance between rubbing fenders is 100 ft. Its lifting power, up to the pontoon deck level, is 15,000 tons, but by utilizing the shallow pound this can be increased to 17,500 tons and the walls are of a sufficient height to allow of a vessel drawing 32 ft. to be taken on 3 ft. 6 in. keel blocks.

Primarily, this dock is intended to lift the line-of-battleships of 15,000 tons displacement with a length of bearing keel of 343 ft., but in addition it has to deal with cruisers of the Terrible class, of about the same displacement, but with 383 ft. of bearing keel, and lastly, auxiliary cruisers like the Campania, weighing some 17,000 tons, with a bearing length of keel of 502 ft. Like the original Bermuda dock, that under discussion is a self-docking dock—that is, it can lift all parts of itself out of water, a most necessary facility in the sub-tropical sea of Bermuda. The dock itself consists of five portions, comprising three pontoons, which form the main lifting portion of the dock, and two side walls, which, whilst affording a certain amount of lifting power, primarily serve to give the dock stability, and to regulate its descent when the pontoons are submerged. The center pontoon, which is 300 ft. long, is rectangular in shape, but the two terminal pontoons, 120 ft. long, have each only 71 ft. of that length rectangular in shape, the remainder being finished off in the form of a blunt-nosed point or bow. The sides of the rectangular portion of all the pontoons are built up so as to form a broad altar standing 12 ft. above the dock.

The side walls, which come each side of the pontoons, to which they are attached by double fish-plates and tapered pins taking on to the steel lugs built into the structure both of the wall and pontoon—thus enabling any of the pontoons to be disconnected for the purpose of self-docking—are rectangular structures 435 ft. long by 53 ft. 3 in. high. From their base up to the altar level their width is 13 ft. 2 in., but from here they batter back to the engine deck, where their width is 9 ft. 1 in. Where the boilers occur, however, this engine deck is built out at the back to form a chamber 12 ft. 6 in. wide. The walls are pierced with two gangway openings, admitting light and air into the interior, and the upper portions or towers are put down at each end, leaving a flat on which the bollards are placed and the swinging bridges which give access from the top of one wall to that of the other. The ends of the wide walls are bevelled off from the back of the same line as that of the pointed portion of the pontoons, thus forming a continuous bow line for the purposes of facilitating the towing.

The pontoons of the dock are divided into forty pumping divisions, of which thirty-two are absolutely water-tight and distinct. The side walls have each eight water-tight divisions. All these fifty-six divisions are provided with a separate pipe, each governed by a separate valve. All the pipes in the starboard half of the dock are led directly into the main drain in the starboard wall and those on the port side into the port wall. These drains are continuous over the whole length of the walls, and the four 18-in. centrifugal pumps in each wall are seated directly on them, so that any one pump can empty all the compartments of its half of dock. Furthermore, the central bulkhead dividing the dock into the two halves is not entirely water-tight, but small drainage or leakage holes are left in it, so that even in the event of a complete breakdown of the whole of the plant, the other half could still slowly empty the whole dock. A separate condensing compound engine driving directly on to the pump shaft is provided for each pump, and a separate return tube marine boiler for each pair of engines. The steam pipes are, however, so arranged that either engine can take its steam from either boiler. Each boiler, engine, and pump is therefore duplicated in each wall, and, further, each wall duplicates the other, so that if only one boiler, engine, and pump remain available the dock can still be lifted. The working of the whole dock is all done from a central position on the top of each tower. Special provision has been made on the broad altars for the support of the armor belt of battleships, a stiff channel running along on top of them into which the heels of the vertical shores can be stepped, whilst similar channels along the face of the altars receive the raking shores that support the bilges, the shape of the dock at this part resembling fairly closely the stone steps or altars of an ordinary masonry dock.

The dock is provided with the usual fittings in the way of strong bollards on the low walls and timber heads on the top deck, and for warping the vessel into place six powerful vertical steam capstans are provided with sheaves or fairleads on the edge of the top deck. An electric light installation with its own generating plant is provided in one wall for lighting all the interior compartments of the dock, and, in addition, twelve arc lamps are carried on gallows on top of the towers. Traveling and swinging electric cranes can run along the whole length of each wall. They are of five tons lifting power, with a jib radius of 36 ft. and a lift of 35 ft. above the top deck. They are electrically driven by means of a separate generating plant placed in the towers, but this plant is so arranged with the electric lighting plant that they can be used alternately or together for either lighting or working the cranes. These auxiliary installations, whilst usually taking their steam from the dock's boilers, are each provided with their own boilers, making them independent therefore of the main pumping installation.

A complete drainage service communicating with all the dock compartments, and capable of emptying them completely, is installed in each wall, and by the alteration of a coupling this service can also be used as a washing down service, by means of which the outside of the ships on the dock can be washed down on their inside tanks tested with water. The bottom of the pontoon is protected by a series of bilge keels of greenheart, as it is possible that at low water the dock may to a certain extent sit upon the rough coral bottom of the harbor where she will be moored. The top decks of the walls are planked with teak, with a waterway all round, and arrangements are made in view of the scarcity of fresh water at

Bermuda for catching and running into the reserve water tanks inside the walls, all rain water falling on these decks.

The pumping machinery of the dock has been provided and erected by the Wallsend Slipway & Engineering Co., Ltd., the engines and pumps being by Allen & Co. of Bedford. The electric lighting installation, the electric traveling cranes, and the generating plant for the same are made by Clarke, Chapman & Co., Ltd., who also fitted the steam capstans on the top deck.

OUR TRADE WITH GERMANY.

The cordiality of the relations between the United States and Germany is shown more eloquently than by speeches and more forcibly than by the booming of cannon by the figures which show the commerce between the two countries during the last few years. These figures show that the commerce of the United States with Germany exceeds that with any other country of the world except the United Kingdom, that our imports from Germany in the fiscal year 1901 were larger than those of any preceding year, with a single exception; that our exports to that country in 1901 were larger than in any preceding year, and that our total commerce with Germany in 1901 was larger than in any earlier year. This commerce has grown from less than \$30,000,000 in 1865 to nearly \$300,000,000 in 1901; or, to be more exact, from \$29,878,845 in 1865 to \$292,226,329 in 1901, the total for 1901 being practically ten times as great as that of 1865.

An examination of the details shows that the percentage of increase in imports from Germany has been greater than the percentage of growth in exports to Germany, the figures being: Imports into the United States from Germany, in 1865, \$9,563,743; in 1901, \$100,445,902. On the other hand, the exports from the United States to Germany were, in 1865, \$20,315,102; in 1901, \$191,780,427. Thus the imports into the United States from Germany are more than ten times as much in 1901 as in 1865, and our exports to Germany about nine and one-half times as much in 1901 as in 1865.

The following table, from the official reports of the treasury bureau of statistics, shows the total imports into the United States from, and exports from the United States to Germany, at quinquennial periods from 1865 to 1901:

Fiscal year.	Imports from Germany.	Exports to Germany.	Total.
1865	\$ 9,563,743	\$ 20,315,102	\$ 29,878,845
1870	27,015,321	42,288,877	69,304,198
1875	40,247,712	50,466,025	90,713,737
1880	52,211,237	57,062,263	109,273,500
1885	63,241,753	62,222,791	125,464,544
1890	98,837,683	85,563,312	184,400,995
1895	81,014,065	92,357,163	173,371,228
1900	97,374,700	187,347,889	284,722,589
1901	100,445,902	191,780,427	292,226,329

Finished manufactures form the chief features of the imports into the United States from Germany, and foodstuffs and manufacturers' materials form the chief features of our exports to Germany. Sugar, chemicals, cotton manufactures, silk manufactures, leather and manufactures, toys, earthen, stone, and chinaware, wool manufactures, iron and steel manufactures, and cement are the principal items in our imports from Germany; while raw cotton, corn, wheat, flour, pork and beef products, mineral oils, tobacco, oil cake and meal, naval stores, wood and manufactures thereof, and copper form the chief features of our exports to Germany. In a few classes of manufactures, however, notably iron and steel, the exports to Germany are considerable, but, as above indicated, the bulk of the movement from the United States to that country is composed of articles required in Germany for food or manufacturing and which that country does not produce in sufficient quantities; while, on the other hand, the bulk of the imports into the United States from Germany are foodstuffs not produced at home or the higher grades of manufactures, such as sugar, wines, coffee, rice, chemicals, gloves, laces and knit goods, woolen dress goods, silk dress goods, cutlery, porcelain and chinaware, and toys.

The following tables show the principal imports into the United States from Germany, and principal exports from the United States to that country in the fiscal year 1901:

PRINCIPAL ARTICLES IMPORTED FROM GERMANY, FISCAL YEAR 1901.
Sugar
Chemicals, drugs
Cotton manufactures ..
Silk manufactures ..
Leather and mfrs....
Toys
Earthen and stoneware ..
Wool manufactures ..
Iron and steel mfrs....
Cement
Paper and mfrs.....
Books, etchings, etc...
Flax, hemp, jute mfrs.

PRINCIPAL ARTICLES EXPORTED TO GERMANY, FISCAL YEAR 1901.
Raw cotton
Corn
Pork products
Mineral oil
Wheat
Copper and mfrs....
Iron and steel mfrs....
Oil cake and meal....
Wood and mfrs....
Tobacco and mfrs....
Oleomargarine
Naval stores
Flour
Seeds
Beef products
Leather, and mfrs....
Paraffin and prfn wax.

Mr. H. E. Dantzebecher, yacht designer, of Philadelphia, located in the Bourse of that city, has a contract for a 35-ft. launch, to be fitted with an 8 H.P. "Motor De Luxe" gas engine, furnished by the Motor Vehicle Power Co. of the same city, guaranteeing a speed of 10 miles per hour. He also has on the boards a fine 53-ft. boat to be fitted with the same power, for a well-known yachtsman; also other craft of similar character. Mr. Dantzebecher helped design and build the Yankee Doodle, and designed and built the fast coaching launch Ben Franklin for the University of Pennsylvania; also the steam yacht Impartial.

The state of Massachusetts is contemplating appropriating \$300,000 to rebuild the old frigate Constitution as it was in the war of 1812.

SENATOR FRYE ON THE SHIPPING BILL.

At the annual dinner of the Manufacturers' Club in Philadelphia Senator Frye made an address upon the shipping bill in which he said:

"Your ships cost 20 to 30 per cent. more to build than those of the Clyde and Germany. Raw material is cheaper here, but that is only half the cost; the other half is labor. And the wages paid in America are double those paid on the Clyde, and more than double those paid in Germany. The Atlantic Transport line contracted for six ships here, believing that congress would do something for American shipping. The cost is 25 per cent. more than in England. The company declares that if congress gives no assistance it will be compelled to put those six ships under a foreign flag.

"The difference in cost does not worry me, but the difference in wages does. I once got accurate and complete figures from our consul general in Liverpool. They showed American wages 50 per cent. higher than the average paid in other countries. The cost of living on American ships is 30 to 45 per cent. higher than on foreign ships. The wages and cost of supporting the crew of the steamship St. Louis of the American line for one month is \$11,436; on the Oceanic, British, it is \$8,960; on the Kaiser Wilhelm der Grosse, German, it is \$7,550. Equalize the tonnage, speed and number of crew, and you will see that we pay nearly 50 per cent. more to our seamen than our rivals do. How can we compete with them? Last year Great Britain paid \$6,000,000 in shipping subsidies. Germany—and the emperor knows what he is doing—is from now on to be our greatest rival, and she pays \$2,000,000 a year. France last year paid millions in subsidies, and the harbor of San Francisco was filled with French vessels carrying American grain to the east. Even Spain paid last year \$1,629,000 to her ship owners. Are we going to submit to this? I have no interest in this matter except as an American. I do not own an inch of a ship. Look at your exports. The year before McKinley was elected they were \$228,000,000, last year \$412,000,000, and they will increase in the same ratio. What are you going to do with them? If you have a surplus and cannot sell, it means stagnation at home, manufacturers without profits, laborers without wages. You must have an outlet. The only way to get that is to promote expansion and send our goods abroad in our own ships. A country like this might just as well be without a constitution as without ship yards."

Senator Frye discussed briefly various expedients that had been suggested to meet the difficulty. He characterized the proposal to put a bounty on grain as "silly nonsense." Discriminating duties had been successful early in the country's history, but then there were no exports, and other countries could not retaliate. Moreover, he said, there are now thirty-one commercial treaties in effect, and to abrogate these would be to precipitate a disastrous war of retaliation. He continued:

"The only way is for the treasury of the United States every year to pay out enough money for our ships engaged in foreign trade to give them equal conditions with foreign ships. That is just what the protective tariff does for you manufacturers. Why should it be enjoyed by you and be denied to the shipping of the United States? No intelligent man, who wants to see American ships on the ocean can conscientiously vote against the shipping bill. I believe the subsidy will give us four lines in the Pacific, to Hawaii, Manila, Hong Kong, Japan and Australia. That would mean the building of \$30,000,000 worth of American ships in three years. It would mean lines from here to Brazil and the Argentine Republic. What a shame it is that we have not an American line to South America today, except the Red D to Venezuela. Poor John Roach established a line, as you remember, and he was politically murdered. He had to sell out to New York men, and they lost every dollar they invested."

Senator Frye concluded with a declaration that he would persist to the end in his efforts to have the shipping subsidy bill passed at this congress.

DANGER WARNINGS ON THE SEA COAST.

Lieut. Col. Anderson, chief engineer of the department of marine, recently lectured before the Ottawa Literary and Scientific Society on the subject of "Modern Types of Danger Warnings on the Sea Coast." In the course of his lecture he said:

"We meet with a good deal of difficulty and disappointment in operating our fog signals, because we cannot make mariners understand that sound signals are extremely liable to aerial disturbance. Theoretically sound waves are propagated in straight lines in all directions from their source, exactly as light waves are propagated. Practically these straight lines of sound waves are deflected by any little irregularity in the air through which they pass. If the air is not wholly homogeneous, the sound waves will not pass through it in straight lines, but will be deflected, and whether the deflection is down toward the surface of the water, or up into the air, the effect is the same; the sound does not travel parallel to the surface of the sea, and is lost to the sailor who is listening for it. A small island, a reef, or rocks, or even a shoal lying outside of a fog-alarm station, will have the effect of unequally heating the air which covers them, and the air thus separated into strata of unequal densities causes refraction of the waves of sound, and the fog alarm becomes ineffective. The same thing may happen, though it is not so likely to do so, where none of these natural obstructions are apparent. Times without number complaint has been made that one of our fog alarms was not in operation, when investigation proved that it was sounding as loudly as ever, the trouble being with atmospheric conditions. Some of you may have noticed echoes produced where there was apparently no hill or surface to reflect the sound. These echoes must have been reflected from strata of air differing greatly in density from that at the point of production of the sound, and are one example of the difficulties that fog alarm signals strive in vain to overcome. For these reasons we warn mariners that they must never judge their distance from a fog signal either by the power of the sound, or by the absence of sound, because under certain conditions of atmosphere the sound may be heard loudly at long distances from the alarm; under other conditions it may be lost at a very short distance, and these conditions may vary at the same station within very short intervals of time or of space. Unfortunately it seems impossible to convince captains of this, and many wrecks have resulted from their ignorance of these well-known aberrations."

"You may have noticed in the public press during the past year many

vigorous attacks on the lighthouse system in Canada. To read them one would think that all our lights and fog alarms were obsolete. If you make allowance for the immense extent of sea coast that we have to cover, for the youth of the country, and for the fact that all our aids to navigation are absolutely free to shipping, you will admit that Canada has accomplished a wonderful work, and one that should receive praise instead of censure, when I tell you that since confederation the number of our lighthouses has increased from 227 to nearly 900, and of steam fog alarms from two to sixty-four. This large number of aids to navigation, besides thousands of buoys and other minor aids that have not been mentioned, are maintained at an annual expenditure of about \$500,000. It is true that many of our lights are not strictly modern first-class lights, but all of them are good, serviceable lights under ordinary conditions of weather, and our fog alarms are as modern and powerful as any in existence. We have the testimony of one commander-in-chief of the North American station after another of the efficiency of our system, and many of the recent attacks on it have been inspired by a few shippers having selfish ends in view. If our lights are not perfect, we are improving them and adding to their number every year, and are also establishing new fog alarm stations, but even in their present condition they are ample to secure safety to a carefully and intelligently navigated ship. What we in Canada require more than improvements in aids to navigation, is education of the sailors and pilots frequenting our waters in modern methods of navigation."

COMMERCE WITH JAPAN.

"Commercial Japan in 1900" is the title of a monograph just issued by the treasury bureau of statistics. It is based upon the latest commercial report of the Japanese government, just received by the treasury bureau of statistics, and shows the commerce of Japan with the world and especially with the United States, and the commerce of the United States with Japan and its remarkable growth. It shows that the foreign commerce of Japan, which in 1878 amounted to less than 60,000,000 yen, was in 1890 about 500,000,000 yen. The progressive spirit of the Japanese is also shown by the fact that her own people are rapidly increasing their proportion in the trade of Japan with foreign countries. In 1890, only about 12 per cent. of the foreign trade of Japan was conducted by Japanese; in 1900, 37 per cent. of the foreign commerce of Japan was conducted by her own citizens.

The trade of Japan with the United States has grown with even greater proportionate rapidity than her total trade or than that with any other nation. In 1881 her imports from the United States formed less than 6 per cent. of the total importations into Japan, while in 1900 they formed 22 per cent. of the total importations. Meantime Great Britain's share in the imports of Japan fell from 52 per cent. in 1881 to 25 per cent. in 1900.

The United States is Japan's largest customer, by reason of the fact that the chief export products of Japan are articles required by the manufacturers of the United States and which can not be produced in this country. The total exports from Japan in 1900 amounted to 198,000,000 yen, and of this amount 52,566,000 yen went to the United States. Of this later sum, 26,710,000 yen consisted of raw silk, 5,972,000 yen manufactures of silk, 6,930,000 yen tea, 3,000,000 yen mats for floors, and 1,000,000 yen rice. The growth in exports from Japan to the United States has been chiefly in raw silk, having more than doubled since 1893.

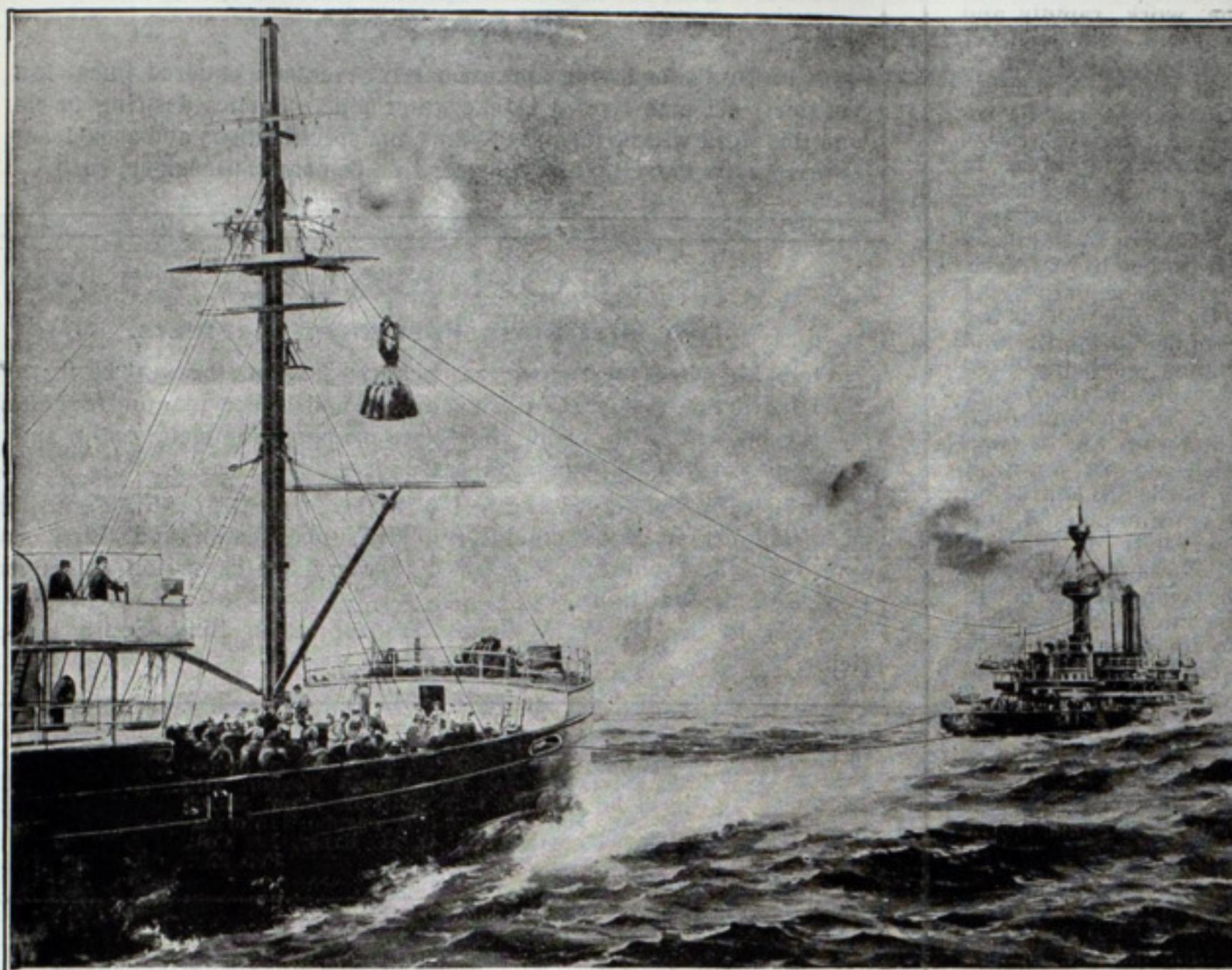
Japan's imports from the United States have grown with even greater rapidity than her exports to the United States. In 1881 they amounted to but 1,781,108 yen, and in 1900 had reached 62,761,196 yen in value. They have grown with much greater rapidity than the total importations of Japan, our share of her import trade having increased from 5.72 per cent. in 1881 to 21.93 per cent. in 1900; while the United Kingdom, our principal competitor in that market, which furnished in 1881 52.57 per cent. of the total imports of Japan, supplied in 1900 25.03 per cent. A detailed examination of the supplies furnished by the United States to Japan can perhaps be better made from our own standpoint measured in dollars. In the fiscal year 1892 our total exports of domestic merchandise to Japan amounted to \$3,288,282, and in 1901 to \$18,656,899. Of this total, the largest item of export was illuminating oil, which aggregated \$4,784,350; the next largest item being manufactures of iron and steel, with a total of \$4,649,287. Third in rank is raw cotton, with a total of \$4,086,317; other important items being breadstuffs, \$1,107,235; provisions, \$399,684; scientific instruments, \$376,068; leather and manufactures, \$285,551; tobacco and manufactures, \$238,890; clocks and watches, \$237,381; paper and manufactures, \$206,586; lubricating oil, \$197,342, and paraffin, \$167,118; while many other articles of less importance have found a place in the markets of Japan. Taking up the great class of iron and steel and examining its details, it is found that the exports of locomotive engines in 1901 amounted to \$372,162 in value; builders' hardware, \$121,697; sewing machines, \$30,979; firearms, \$42,512; car wheels, \$20,773; other machinery, \$1,481,796, and miscellaneous manufactures of iron and steel \$2,579,368.

Our exports of illuminating oil to Japan, which in 1890 amounted to \$3,559,395 in value, showed in 1901 a total of \$4,784,350, despite the active competition of Russian and Sumatran petroleum, and the further fact that Japan is now herself supplying a part of her consumption of that product. Our exports of raw cotton to Japan have grown from but \$85,211 in 1890 to \$4,086,317 in 1901. Our exports of flour to Japan increased from \$127,120 in 1890 to \$1,035,893 in 1901. This increase is evidently due to a growing disposition among the Japanese to consume more of this class of food rather than to rely upon rice, as in former years, since the number of foreigners in Japan, other than Chinese and Koreans, amounts to less than 4,000, and has not materially increased during the period in which our exports of flour to that country have increased seven fold. Our exports of paper and manufactures to Japan have grown very rapidly, being in 1890, \$1,606; in 1896, \$10,126; and in 1901, \$206,586. Scientific instruments increased from \$9,441 in 1890 to \$376,068 in 1901. Canned beef exports increased from \$11,212 in 1890 to \$140,648 in 1901, while exports of pickled beef advanced from \$638 in 1890 to \$72,325 in 1901.

The Algoma Steel Co., a part of the Clergue group of enterprises at Sault Ste. Marie, cast its first ingot on Tuesday of last week. The company does not as yet make its own pig iron, but the pigs used in this ingot came from the Midland furnaces and were made of ore from the Helen mine at Michipicoten, so that the first product of the steel works is entirely Canadian.

COALING AT SEA—BRITISH ADMIRALTY TESTS.

The Lidgerwood-Miller marine cableway, manufactured by the well-known Lidgerwood company of 96 Liberty street, New York, and designed to transfer coal, ammunition, supplies and provisions at sea, was described in the Review some time ago when tests were made at sea



COALING THE TRAFALGAR AT SEA.

between vessels of the United States navy. Important improvements have lately been made in the system and attention is again directed to it on account of sea trials undertaken by the British admiralty. It is reported from England that results of the admiralty trials point to the practical solution of this most troublesome of problems confronting naval

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experts the world over. Other tests are to follow on battleships in this country and it is confidently expected that the cableway will be generally adopted for the United States navy. Russia has already applied it to the greatest of her battleships, now building in this country at the works of the Cramps, Philadelphia. The London Times, most conservative of the English publications and the one standing closest to the British government, said after the British tests that the "problem of coaling war ships at sea seems near to solution." Mr. Spencer Miller, the inventor, is confident since these latest trials that whatever difficulties may have been encountered heretofore in the perfect working of the device have clearly been overcome in a most satisfactory manner in the latest form of the cableway and that its capacity has been increased to a degree that will enable it to give the maximum service desired.

It will be remembered that in the trials made by the United States navy department it was required that the cableway transfer 20 tons of coal an hour with a distance of 300 ft. between ships speeding at the rate of 6 knots. This was accomplished in a heavy seaway. In the test by the British admiralty the required amount to be transferred was increased to 40 tons an hour and the distance between ships 400 ft. (making for greater safety), while the speed of vessels was almost doubled. These tests, made off Portsmouth in the English channel on the 4th inst. with the battleship Trafalgar and collier Muriel in tow, lasted three hours and are reported to have developed a maximum of 40 tons of coal transferred per hour.

The engraving on this page shows the two British vessels while making the tests and gives a good idea of the working of the cableway. The pair of sheaves which were formerly required upon the after deck of the towing vessel and a canvas chute down which the bags of coal were dropped have now been done away with. When the load of bags reaches a point in transit immediately over the after deck of the receiving vessel all the cables are pulled down to the deck, the loaded bags deposited, the empty ones hooked on, and the cables tautened up again and traveler returned. In the test by the British admiralty

a large square mast was fitted in the fore part of the collier Muriel and from the top of this the cableway extended to the quarter deck of the Trafalgar. An elevator runs on rails secured to this mast and hoists a ton of coal in bags 65 ft. up to the mast head. A traveling carriage takes the coal bags from the elevator and transfers them at great speed to the warship. A trip every minute is easily accomplished. The traveler is propelled back and forth by a wire rope $\frac{1}{2}$ -in. in diameter, operated by two direct-acting engines having two 10x10-in. cylinders and slipping drums. Instead of using a sea anchor to keep an equal strain on the main cable between the vessels, the same result was ingeniously accomplished by the use of a main cable tension engine, which automatically keeps the cable taut while permitting its length to vary. This engine has two 13x13-in. steam cylinders, and is geared to a slipping drum. The engine turns in the same direction all the time and the slipping drum is given a definite power of about 5 tons by the slip of its friction heads. Hence the drum maintains a constant pull on the main cable, revolving one way and then the other as the movement of the ship requires greater or less length of cable.

A new chart of the Straits of Mackinac, in colors, has just been issued by the United States lake survey office, and can be secured through the Marine Review Pub. Co., Cleveland, Ohio.

For navigation charts apply to the Marine Review.

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BAND RE-SAW.

The machine herewith illustrated was recently placed on the market by the J. A. Fay & Egan Co. of 325-345 West Front street, Cincinnati, Ohio, and is known as their No. 36 band re-saw. This machine will be found very valuable for converting lumber for ship yards and arsenals and will do the work rapidly and accurately. It will saw either straight or beveling, and owing to the position of the rolls with relation to the blade short pieces can be re-sawed to advantage. It will re-saw material 30 in. wide and 13 in. in thickness; will re-saw to the center of 10 in. and will saw from the side of a timber 8 in. thick, or will take a 5-in. piece from a timber 13 in. thick.

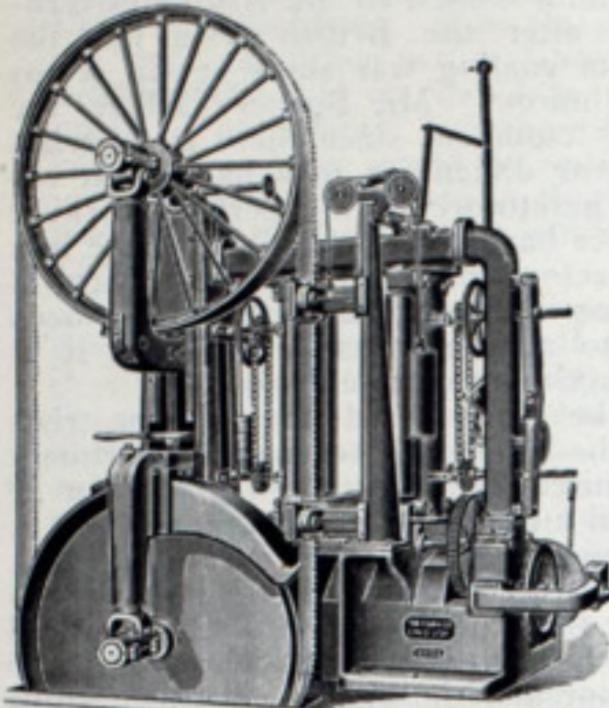
The wheels are made entirely of iron and steel, the lower one being solid and of ample strength and weight and the upper one being fitted with spokes placed in a staggering position. There is an improved method of maintaining the tension on the saw, which is most sensitive. The feed is very powerful, consisting of four feed rolls 5 in. in diameter, strongly geared, continuous and perfect. The adjustments are made very rapidly and accurately.

Altogether this new machine will be found to contain many new mechanical arrangements and conveniences, and the manufacturers will be pleased to furnish any of our readers who may be interested, and will write them, prices and full particulars, and will also forward their large new illustrated 450-page catalogue and colored poster, showing this and other machines they make, free of charge, on application.

Arrangements for the erection of the new Pickands, Mather & Co. blast furnace plant, with coal and ore docks at Toledo, are being hurried and it is hoped that some ore may be stocked at the works before the close of the coming season. The works will be located just below the Craig ship yard. The river frontage is 2,200 ft.

The success, or lack of success, of propeller wheels is largely attributable to the care, or lack of care, in fitting the conditions of each particular case. Especial attention is given that very important subject by the Marine Iron Works, station A, Chicago, resulting in their being in receipt of many orders for propeller wheels within their range of sizes (18 in. to 6 ft.), and in the speed, cruising or towing patterns, as may be required.

6

**Steamer I. M. Weston For Sale.**

Length, 96.5 ft.; breadth, 18 ft.; depth, 7.6 ft.; 95 tons. In first-class condition. E. J. Glackin, 363 So. Morgan street, Chicago. tf

WANTED.

Proposals for laying approximately seventeen-hundred lineal feet of thirty-six inch riveted intake water pipe. Parties desiring to bid on this work will be furnished plans and specifications and should address Austin Farrell, Supt., Pioneer Iron Company, Gladstone, Mich.

Feb. 27.

FOR SALE.**Two First-Class Passenger Steamers.**

One side-wheel steel steamer. Length, 201.4 ft.; beam, 32.5 ft.; over all, 56 ft.; depth, 9.4 ft. Hull, machinery and boiler in good condition. Has upper deck with cabin and state rooms; complete outfit and is allowed to carry 1,500 excursion passengers.

One steel propeller. Length, 155 ft.; beam, 30 ft.; depth, 9.7 ft. Hull and machinery in good condition. Has upper cabin and thirty state rooms; complete outfit. Is allowed to carry 500 excursion passengers. Speed, 15 miles per hour.

Apply to the H. W. Williams Transportation Line, South Haven, Mich.

tf

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., January 27, 1902. Sealed proposals for dredging at Calumet Harbor, Ill., will be received here until 12 noon, March 5, 1902, and then publicly opened. Information on application. O. H. Ernst, Lt. Col., Engrs.

Feb. 27.

U. S. Engineer Office, Buffalo, N. Y., February 1, 1902. Sealed proposals for removal of wreck in harbor at Buffalo, N. Y., will be received here until 11 A. M., March 4, 1902, and then opened. Information furnished on application. T. W. Symons, Major, Engrs.

Feb. 27.

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Year.	Australien	Polynésien	Armand Béhic	Ville de la Ciotat	Ernest Simons	Chili	Cordillère	Laos	Indus	Tonkin	Annam	Atlantique
1890.....	67,728	2,460										
1891.....	68,247	68,331	204									
1892.....	68,247	68,403	69,822	23,259								
1893.....	68,379	68,343	68,286	68,247								
1894.....	68,439	68,367	68,574	68,439	37,701							
1895....	68,673	68,766	68,739	68,808	40,887	28,713						
1896.....	69,534	92,718	69,696	69,549	62,205	63,153	40,716					
1897.....	68,250	69,606	92,736	69,555	62,235	76,110	63,357	43,146				
1898.....	70,938	69,534	69,552	69,597	62,526	63,240	63,240	62,553	63,954	22,707		
1899.....	69,534	69,615	67,431	90,405	60,246	62,778	62,868	52,344	54,855	44,007	22,884	
1900...	69,534	67,494	69,744	69,564	61,719	62,382	62,502	51,471	53,373	62,016	63,066	52,140
Total.....	757,503	713,637	644,784	597,423	387,519	356,376	292,683	209,514	172,182	128,730	85,950	52,140

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